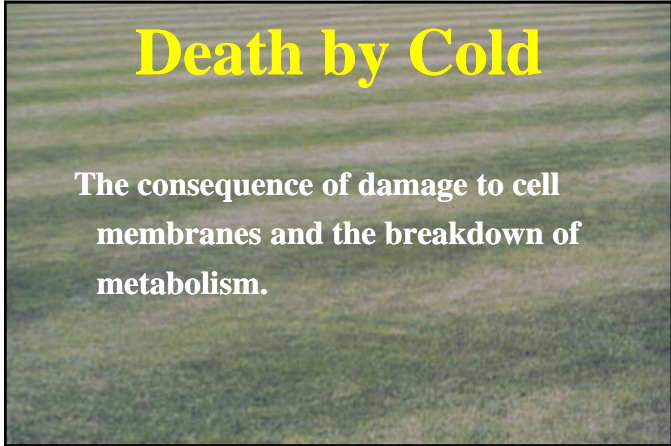


**Defining Winter Kill:
What is it and how does it occur!**

Clint Waltz, Ph.D.
Professor
The University of Georgia



Winter Kill
What is it?



Death by Cold

The consequence of damage to cell membranes and the breakdown of metabolism.



Winter Kill

What does the research show?



Winter Kill

Research

- ★ Not much
 - ✓ hard to study
 - ✓ difficult to replicate conditions
 - ✓ Relative “killing” temperatures
 - ✓ combination of science and practical experience
- ★ Many factors and stresses influence winter injury



Winter Kill

What do we know?

Winter Kill

Primarily on Warm-season Grasses

- ★ Centipedegrass
- ★ St. Augustinegrass
- ★ Seashore Paspalum
- ★ Bermudagrass
- ★ Zoysiagrass

Winter Kill

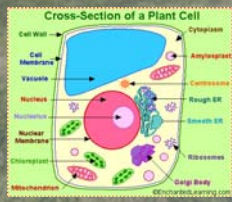
Low-Temperature Injury

- ★ Crown Hydration
- ★ Direct low-temperature exposure
- ★ Desiccation
- ★ Traffic

Low-Temperature Injury

Crown Hydration

- ★ Intracellular
 - ✓ formation of ice within the cell
 - ✓ 14° to 23° F
 - ✓ cell rupture & death
 - ✓ more common in the spring
 - ✓ poorly drained areas



Low-Temperature Injury

↳ Crown Hydration

★ Extracellular

- ✓ formation of ice between protoplasts & cell wall
- ✓ draws water from within the cell
- ✓ dehydrates the cell & death
- ✓ limited soil moisture – drought or frozen soil
- ✓ common during dry, cold weather
- ✓ exposed sites (e.g. greens, hillsides, etc.)

Low-Temperature Injury

↳ Direct low-temperature exposure

★ Not hardened-off

- ✓ lush growth more susceptible
- ✓ gradual decrease in temperature
- ✓ 10% to 25% reduction in tissue water content
- ✓ accumulation of carbohydrates
- ✓ prior frost events

Low-Temperature Injury

↳ Direct low-temperature exposure

★ Warm-season Grasses

- ✓ rapid decrease in temperature
- ✓ below 23° F
- ✓ loss of membrane function
- ✓ water-soaked appearance of leaves

Bermudagrass Low-Temperature Injury

Fairways (°F)			
Vegetative		Seeded	
Midlawn	16.9 a	Yukon	18.3 a
Quickstand	17.6 ab	Guymon	18.7 ab
TifSport	19.0 bc	Jackpot	20.7 abc
Tifway	19.9 cd	Mirage	21.0 bc
Baby	19.9 cd	AZ Common	21.9 c
GN-1	21.3 c		

Anderson, Taliaferro, and Martin, 2002

Bermudagrass Low-Temperature Injury

Greens (°F)	
Vegetative	
Tifgreen	20.3 a
Tifdwarf	20.3 ab
TifEagle	21.2 ab
MiniVerde	21.6 bc
MS Supreme	22.6 cd
Floradwarf	23.2 d
Champion	23.4 d

Anderson, Taliaferro, and Martin, 2002

Low-Temperature Injury

↳ Desiccation (Drying out)

★ Environmental influences

- ✓ wind & low humidity
- ✓ limited soil moisture – drought or frozen soil

★ Maintain soil moisture

- ✓ monitor soil moisture
- ✓ light irrigation during winter if no rainfall
- ✓ spring during root development

Low-Temperature Injury

↳ Traffic

- ★ Foot and vehicular damage
 - ✓ frozen crowns easily damaged
- ★ Compaction
 - ✓ reduced rooting & health
 - ✓ reduced oxygen
 - ✓ lower infiltration and percolation rates

Winter Kill

Common questions

Winter Kill

↳ Questions at time of cold injury

- ★ Can a wetting agent help?
- ★ Can anti-transparent be used to reduce desiccation?
- ★ Can I “ice” my greens during the cold weather, like strawberry and citrus farmers?
- ★ How do I know if the grass will green-up?

Winter Kill

Questions at time of cold injury

- ★ Do plants feel wind chill?
- ★ Others

Winter Kill

Questions at time of cold injury

- ★ Can a wetting agent help?
 - ✓ Possible but unsure

Winter Kill

Questions at time of cold injury

- ★ Can anti-transparent be used to reduce desiccation?
 - ✓ Possible but unsure

Winter Kill

Questions at time of cold injury

- ★ Can I “ice” my greens during the cold weather, like strawberry and citrus farmers?
 - ✓ Sure but don’t expect it to help
 - ✓ Ice freezing is an exothermic reaction, heat is produced
 - ✓ Temperatures must range between 28° & 32° F
 - ✓ Low temperatures can’t last for more than 4 hours

Winter Kill

Questions at time of cold injury

- ★ Can I “ice” my greens during the cold weather, like strawberry and citrus farmers?
 - ✓ Too much or too little moisture is the typical problem
 - ✓ If thaw during the day then freeze at night, making intracellular ice formation possible
 - ✓ Could cause more harm than good

Winter Kill

Questions at time of cold injury

- ★ How do I know if the grass will green-up?
 - ✓ Put sample inside and observe it for 7 to 14 days
 - ✓ Keep near window or light – 8 to 10 h of light
 - ✓ Keep warm
 - ✓ Keep moist – not wet
 - ✓ Should initiate growth in 7 to 10 days
 - ✓ Repeat every 14 to 21 days during cold weather

Winter Kill

Questions at time of cold injury

- ★ Do plants feel wind chill?
 - ✓ No!
 - ✓ Pay attention to the ambient air temperatures, not the wind chill temperatures
 - ✓ Watching the relative humidity can indicate drying conditions

Winter Kill

Don't get confused!

- ★ Spring Dead Spot (SDS) – *Ophiosphaerella*
 - ✓ Pathogen
 - ✓ Did damage in fall but see in spring



Centipedegrass



Centipede – Problems

Failure to Green-up & Dead Grass

- ✓ Harsh winter
- ✓ Shady areas
- ✓ North facing slopes
- ✓ Ice & snow
- ✓ Moving water
- ✓ Recently sodded



Dead centipede grass

Centipede – Problems

Solutions

- ★ Renovate or rejuvenate
 - ✓ Open the canopy
 - ✓ Rake-out thatch & leaf debris
 - ✎ Verticutting – 1 direction (don't be too aggressive)
 - ✓ Interseed – 0.5-lb seed / 1000 ft²
 - ✓ Fertility
 - ✓ higher than normal (1.5 to 2.0 lbs / 1000 ft²)
 - ✓ soil test for P & K

Centipede – Problems

Solutions

- ★ Reestablish
 - ✓ Sod
 - ✓ Seed – preemergence?
 - ✓ Cultivars – Common & TifBlair
 - ✓ Get started as early as possible
 - ✓ Remove existing grass
 - ✓ Till & add organic matter
 - ✓ Normal establishment practices

Important Dates in 2014



UGA Turfgrass Research Field Day – August 6
For other local programs contact your CEA

Thank You



twitter
@GeorgiaTurf

Visit
www.GeorgiaTurf.com
