PURDUE EXTENSION

Winterkill Here on Bermudagrass! Now What?

This winter has resulted in significant winterkill on bermudagrass throughout the nation and Indiana was not an exception. Brutally cold temperatures, coined as the polar vortex, swept through the country in early January with many other subsequent cold days and nights to follow. Below is a summary of the damage that I have observed this spring, factors that resulted in winterkill, and a summary of available options to recover these areas.

Observations and Speculations on Winterkill in Indiana

On recent trips to golf courses, sod farms, and athletic fields I have seen a great deal of winterkill on bermudagrass. The causes vary from location to location, but each of the below factors contributed to bermudagrass winterkill.

When did bermudagrass die? Most of the winterkill likely occurred on two separate occasions or from cumulative cold temperatures. The first incidence was in early January when the first "polar vortex" arrived. Temperatures in Evansville reached -1 F in early January and many southern Indiana counties had no snow cover on the ground on this date to protect the bermudagrass (Fig. 1). A second time period of death likely occurred as snow cover receded in March but temperatures were still cool. Lastly, the accumulation of multiple cold nights with a longer than average winter, caused bermudagrass to winterkill.

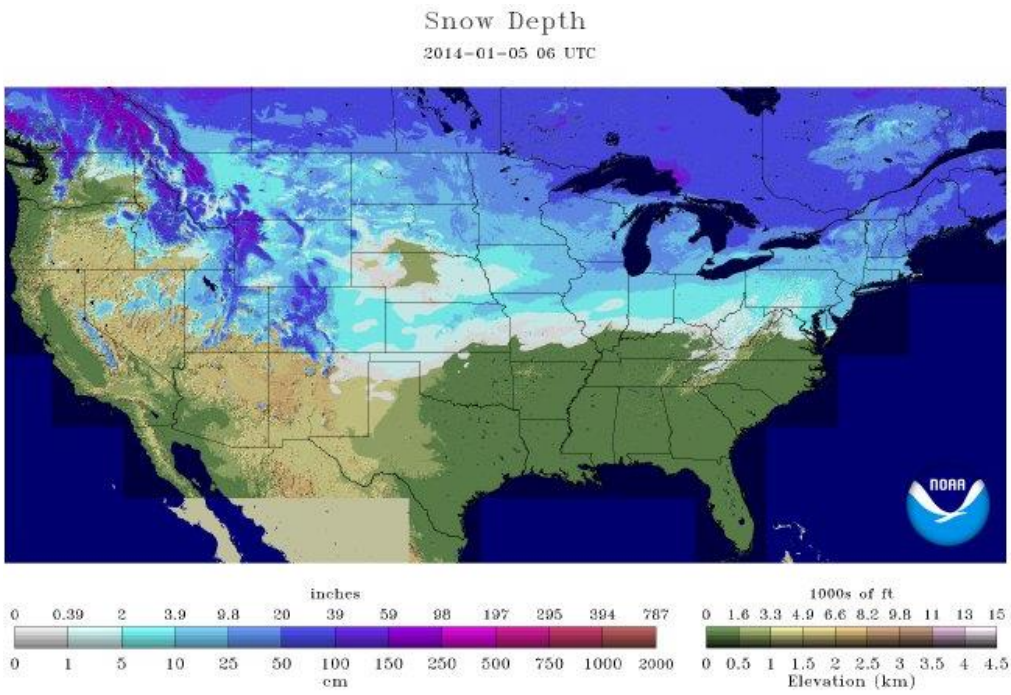

Fig. 1. Snow cover on 5 January 2014.

Most bermudagrass turf has "fully" greened-up from stolons and crowns and many are starting to get some additional growth from rhizomes. Rhizomes that have a light, tan color are still viable and should help with recovery (Fig 2.). If rhizomes are black or necrotic then they are dead. We encourage bermudagrass managers to sample their areas to ascertain how much recovery from rhizomes might be expected.

Fig. 2. Bermudagrass rhizomes that partially survived with new growth (left), partially survived/partially winterkilled with no new growth evident (center), and rhizomes completely winterkilled (right).

Factors Leading to Death (in no particular order)

1. Temperature
   - Cooler than average winter temperatures led to direct low-temperature bermudagrass winterkill across the state. No area was spared.
2. North facing slopes
   - North facing slopes receive less direct sunlight and as a result have cooler surface and soil temperatures leading to death.
3. Poorly drained areas
   - Poorly drained areas or low spots hold water which predisposes bermudagrass to more injury. Bermudagrass in these areas have higher tissue water content and the plants are prone to direct freeze damage from ice crystals that form inside plant cells.
4. Shaded areas
   - Bermudagrass is a warm-season grass that prefers growing in full sun areas. Shaded areas receive less sunlight and consequently the bermudagrass plants in shaded areas have reduced photosynthetic capacity which leads to reduced growth, rhizome and stolon formation, and overall plant health which predisposes these plants to winter injury. Furthermore, shaded areas, like north slopes, stay cooler in the winter which increases the risk for winterkill.
5. Late-planting dates
   - Planting early in the season is key to enhancing bermudagrass winter survival. Bermudagrass planted as sprigs or seed produce very few rhizomes in their first growing season. Rhizomes are important to winter survival as they grow below ground in the soil which better insulates them from winter temperature extremes. In newly planted areas with no rhizomes, the crowns and the stolons must survive the first winter in order for the turf to survive. Because this winter was so severe and because newly planted areas lacked rhizomes, these areas were hardest hit and had the most winterkill.
6. Fall and or winter traffic
   - Many highly trafficked areas had more winterkill than non-trafficked areas and this was especially evident on athletic fields. When possible, reduce traffic on bermudagrass fields prior to and after winter dormancy by either removing traffic or rotating traffic between fields. At a minimum, the number of events played on these fields should be reduced dramatically during fall and winter. Additionally, traffic should be minimal on newly planted fields to reduce the risk for winterkill.
7. Overseeding
   - Overseeding bermudagrass with perennial ryegrass in late-summer and fall is stressful on bermudagrass. The perennial ryegrass competes with the bermudagrass and shades bermudagrass as it acclimates for winter in early fall and as it greens-up in the spring. This shading stress is damaging to

this warm-season grass that prefers full sun. This spring, several athletic, non-overseeded areas (skips during the overseeding process) had more bermudagrass present than overseeded areas.

- To enhance bermudagrasses ability to survive, approximately 100 days of summer growth are needed without the perennial ryegrass present. To help maximize this summer window for bermudagrass growth, "transition herbicides" like Katana, Monument, Revolver and others are used to selectively remove the perennial ryegrass from the bermudagrass in spring (usually May and early June). Thus, bermudagrass would be overseeded with perennial ryegrass after Labor Day (early September) and sprayed out in mid-May each year to all for 100 days (end of May, June, July, August, and first few days of Sept) of growth in an ideal bermudagrass world. However, with game schedules and politics, this schedule is not always possible.

8. Mowing height
   - Taller mowing heights produce plants with more green leaf area. More leaf area allows the plant to produce more photosynthates so that it can grow more rhizomes and stolons, deeper roots, and produce more carbohydrates (energy) prior to winter. As such, taller mown areas survive better than short cut turf.
9. Spring dead spot
   - Spring dead spot (SDS) is generally considered to be the most significant disease of bermudagrass. This disease becomes evident at spring green-up but the pathogen actually infects and damages the bermudagrass in the fall. Fungicide control is difficult and inconsistent, but factors like nutritional status and thatch depth do play a role in the severity of the disease. Many established stands of bermudagrass struggle with this disease. Research is ongoing at Purdue University to help provide solutions for this turf disease.
10. Insulation factor
    - In northern climates like Indiana, economically important bermudagrass areas like championship baseball fields or football fields and golf course putting greens should be covered with a blanket during winter to protect this investment. Areas covered by snow or covered by blankets during our coldest temperatures this winter fared well and had reduced incidents of winterkill.
11. Cultivar
    - It is tough to provide an exact ranking of the winter hardiness of bermudagrass cultivars as we don't always have them planted next to one another for comparison in experiments and because results vary slightly from year to year. Furthermore, some new bermudagrasses such as Latitude 36 and Northbridge have only been around for a couple of years. Many Latitude 36 and Northbridge stands were heavily damaged this year because they were new plantings and not well established with rhizomes. As we learn more about new cultivars, our below rankings will be refined. Based on our observations to date, the following rankings could be used as a good starting point when ranking the winter hardiness of bermudagrasses grown in Indiana this past winter (see Table 1).
    - Latitude 36 = Northbridge = Yukon = Riviera = Patriot = Midlawn > Quickstand > Vamont = Transcontinental > Tifway > Champion

Recovering Damaged Areas

Many turf managers realized the potential for winterkill, heeded the advice of experts, and skipped their spring preemergence herbicide application. These managers are now thankful that they skipped these preemergence herbicide applications as they can now seed, sprig, and sod these damaged areas. Some managers had already applied a preemergence herbicide late last fall or early this spring in February. For these managers, reestablishment will be more difficult as sprigs and sod will have trouble rooting and seedlings will have trouble emerging until the preemergence herbicides begins to breakdown which occurs 2-6 months after application depending on soil temperature and moisture and herbicide application rate.

Table 1. Winter hardiness rankings of bermudagrasses planted at various golf courses, athletic fields, lawns and sods farms in Indiana.

Cultivar	Experimental number	Release Date	Winter Hardiness†
Latitude 36	OKC 1119	2011	Good-Excellent
Northbridge	OKC 1134	2011	Good-Excellent
Yukon	OKS 91-11	2000	Good-Excellent
Riviera	OKS 95-1	2001	Good-Excellent
Patriot	OKC 18-4	2002	Good-Excellent
Midlawn	A-22	1991	Good-Excellent
Quickstand	--	1993	Good
Vamont	VPI C-1	1980	Good-Fair
Transcontinental	PST-R69C		Good-Fair
Tifway	Tifton 419	1960	Fair
Champion	--		Fair-Poor

† Rankings based on past research by Anderson et al. 2002 and 2007, NTEP and observations in Indiana.

One of the biggest challenges in recovery this spring is in the low availability of new, improved bermudagrasses. Because the economy has been tight since 2008 (and even prior to this date for the golf industry), inventory of improved cold hardy bermudagrasses is low at sod farms. Furthermore, two of the newest cold hardy bermudagrasses (Latitude 36 and Northbridge) were released just recently in 2011 and planted acres of these grasses are low because they are so new. As such, many are vying for improved seeded bermudagrass cultivars like Yukon and Riviera or new blends such as Jubilee (Riviera and Transcontinental bermudagrass) since sod and springs are unavailable or available only to a few because of low inventory. While some are changing from cultivars like Vamont and Midlawn which are no longer available, others are re-sprigging with the Quickstand to match their existing turf. Others are even planting perennial ryegrass as a short term solution until they can replant their desired cultivar in 2015.

More information on this topic is available in a previous posting at: Warm-season Turf Winterkill 2014: What Can you Expect and NOW WHAT?

Aaron Patton, Turfgrass Extension Specialist

References:

1. Anderson, J.A., C.M. Taliaferro and D.L. Martin. 2002. Freeze tolerance of bermudagrasses: vegetatively propagated cultivars intended for fairway and putting green use and seed-propagated cultivars. Crop Sci. 42:975-977.
2. Anderson, J.A., C.M. Taliaferro, Y.Q. Wu. 2007. Freeze tolerance of seed- and vegetatively propagated bermudagrasses compared with standard cultivars. *Appl. Turfgrass. Sci.* May 8. p.1-7.
3. NTEP. Various reports. www.ntep.org