



TAHOMA 31[®]

B E R M U D A G R A S S



www.Tahoma31Bermudagrass.com

THE STORY

How a Hike in the Mountains Birthed a Legend

Tahoma 31[®] Bermudagrass is known for both its improved cold-hardiness and improved drought-resistance. And for good reason. Tahoma 31 was bred from two cold-hardy, drought-resistant plants found in some of the most extreme landscapes on the planet. The Mother Plant was collected on a hike in the mountains on the east side of the Himalayas in China, a region known to be very cold and arid. The Father Plant, a fine textured grass, was collected a world away in South Africa, also known for its cold, dry climate.

Dr. Yanqi Wu, Professor of Grass Breeding and Genetics at Oklahoma State University, likes to seek out plant germplasm. Dr. Wu's passion for hiking in extreme climates, while looking for unusual plants, brings us the story of Tahoma 31 Bermudagrass (OKC 1131, Varietal Name).

Dr. Wu and the turfgrass team at OSU grew the parent plants in 2006, and germinated seed in 2007 at the OSU Agronomy Research Farm in Stillwater, OK. From those crosses, 10,000 plus progeny were created. Selection began in 2007. By 2008, just 1600 plants remained and entered outdoor trials. Winter of 2010 brought extreme cold, crushing most of those 1600 plants, #31 the exception. The "31st" plant dominated with early spring green-up and a very dense appearance. "Thirty-one" was chosen in 2011 for further OSU trials, thus the varietal name OKC 1131.



More than a decade of research at OSU, and research centers around the nation through NTEP, and other trials proved the grass' myriad of beneficial qualities. In 2017, OKC 1131 was licensed to Sod Production Services and the hunt began for a suitable name. Research, and a little luck, yielded Tahoma, a Native American word meaning frozen water. Considering the origin of the grass, it seemed fitting, and Tahoma 31 was born.

"This grass is really a unique genotype which combines genetic factors favorable for cold hardiness through gene contribution and interaction between the two parents," says Dr. Wu.

- » COLD HARDY
- » DROUGHT RESISTANT
- » WEAR TOLERANT
- » EARLY SPRING GREEN-UP



DROUGHT RESISTANT

Tahoma 31 showed superior drought resistance over four standard cultivars tested, and averaged 18% less water use than TifTuf.

(source: OSU/USGA Drought Study, Dr. Moss)

Tahoma 31 was bred with improved drought resistance in mind, says OSU's Dr. Wu. "That's the major target that we were assigned by the U.S. Department of Agriculture. This special grass has deep roots and requires a reduced amount of water to maintain healthy growth."

DROUGHT CASE STUDY: OAKS COUNTRY CLUB

In 2016, Tahoma 31 Bermudagrass was planted in the collars of all 18 greens at Oaks Country Club in Tulsa, Oklahoma. Dan Robinson, Oaks' golf course superintendent for more than a decade, says the cold, dry winters in Tulsa, coupled with the fact that the greens need very little winter irrigation, means collars must be hand-watered. Previously, Oaks had another bermudagrass in the collars, where, Robinson says, the other bermudagrass failed two winters in a row and had to be replaced. Since converting to Tahoma 31, the grass has proven drought resistant, Robinson says.

"Last year was an excellent test. It was very cold and very dry," Robinson reports. "Typically we were losing the collar grass to desiccation or drying out in the winters and with Tahoma 31, it's just not the case. This Tahoma 31 is two winters old. We've replaced a single pallet of it, instead of replacing 15 to 20 a year. That was the norm. We were looking for something different and we found it in Tahoma 31."

EVAPOTRANSPIRATION (ET) DATA:

TifTuf ranked consistently in the group of genotypes with the highest Evapotranspiration (ET) rates, whereas Tahoma 31 ranked consistently in the group of genotypes with the lowest ET rates in 2013, 2014, and 2015. Differences in ET rates show potential for breeding programs to develop bermudagrass cultivars with lower ET rates, which may result in reduced overall ET requirements. Low ET rates are desired and indicative of more efficient water use. (source: Evapotranspiration Rates of Turf Bermudagrasses under Non-limiting Soil Moisture Conditions in Oklahoma, Crop Science, May – June 2018, Amgain, et al.)

"We generally define drought resistance as the ability to avoid drought, and the ability to tolerate drought. For example, drought resistance = drought avoidance + drought tolerance," says OSU's Dr. Justin Moss. "It is likely that Tahoma 31 has the ability to grow an extensive, deep root system that helps it avoid drought. It is a relatively low user of water compared to some other bermudagrass cultivars ... it is overall a very good, drought-resistant bermudagrass in field conditions."

OSU's Dr. Dennis Martin says, "It's going to produce a great lawn with lower water use rates and higher water use efficiency" relative to many other bermudagrasses.



Dr. Justin Moss



Tahoma 31 had the **LOWEST WINTER KILL RATES** of all Bermudagrasses tested in NTEP.

Mean scores in two states where winter survivability was measured, Indiana & Kentucky, confirmed Tahoma 31's top status in the three year study period, 2014 - 2017.

Tahoma 31: ONLY 14.5% WINTER KILL

Iron Cutter: 48.7% winter kill

Latitude 36: 53.7% winter kill

TifTuf: 88.3% winter kill

Tahoma 31 was rated by far with the greatest winter survivability in Indiana at only 4% winter kill.

Source: (Morris, 2015, 2014 Table 21C)



OKLAHOMA STATE UNIVERSITY

"This grass is a unique genotype which combines genetic factors so favorably for cold hardiness through gene contribution and interaction between the two parents, one from Asia and another selected from germplasm originally from Africa," says OSU's Yanqi Wu, Ph.D.

UNIVERSITY OF ARKANSAS

"Tahoma 31 was a top performer in our bermudagrass NTEP trials. It has superior cold tolerance and excellent density, color, and texture," confirms Dr. Doug Karcher, Professor of Turfgrass Science, University of Arkansas, Fayetteville.

OAKS COUNTRY CLUB, TULSA

"The difference is Tahoma 31 is surviving the winters," says Dan Robinson, golf course superintendent at Oaks Country Club in Tulsa. Oaks Country Club has had Tahoma 31 in the collars of all 18 greens since the spring of 2016. For two winters prior, the collars were grassed with another bermudagrass and "failed," Robinson says. "We've had it in a golf course environment for two years and in those two years we've lost less than a pallet of it. The interesting thing is how unbelievably cold and dry last winter was and Tahoma 31 survived. OSU struck on something in cold tolerance"



SALT TOLERANT Among the 10 experimental grasses and one older cultivar (Tifway) tested, Tahoma 31 ranked #1 when tested for salinity response.

LOOK AND FEEL Tahoma 31 leaf blades have a dark green color, fine texture, and a very high turf density. Compared to commercial competitors, Tahoma 31 withstands extreme cold temperatures better and greens up faster in the spring.

ADAPTABILITY Tahoma 31 was tested in 19 locations across the United States and its turfgrass quality, an indication of adaptation, ranked in the top 25% of all varieties an incredible 78.5% of the time.

WEAR TOLERANT "It's very aggressive," says Dr. Yanqi Wu, Professor of Grass Breeding and Genetics at Oklahoma State University. Tahoma 31 heals quickly from damage and sports-related wear.

LOW MOWING HEIGHT Tahoma 31 excels at a height of cut at 0.125", says Dr. Wu. In tests from June 1 to August 30, 2018, Tahoma 31 demonstrated that it tolerates low mowing heights and is suitable, under certain maintenance practices, for use on public or municipal golf course greens.

BEAUTY, DENSITY, COLD TOLERANCE

In 2017, 65,000 square feet of Tahoma 31 was planted on the event lawn at Shangri-La Golf Club & Resort in Monkey Island, Oklahoma. For the Fourth of July celebration in 2018, neither the fireworks nor the hot dogs were the topic of conversation; instead, Tahoma 31 drew the most attention.

"That's when people really started noticing the grass," says Justin May, golf course superintendent. "We had the Fourth of July celebration and I don't know how many hundreds of people were there, but none of them sat in their chairs. They all sat in the grass because it was so soft."

"The aggressiveness and strength of the sprigs, even planted late in the bermudagrass growing season, has been extremely impressive. We are excited to see what the early spring green-up brings us next!"

- Jerad Minnick, lead advisor, Natural Grass Advisory Group, shortly after planting Tahoma 31 to test on two sports fields in Maryland.

"We expect to attract home developers as well as sports facility managers with an eye on year-round soccer field use."

- Brad Sherry, owner of Sod by Sherry, licensed producer of Tahoma 31 in a June 14, 2018 article in OKC's The Journal Record.

"Our NTEP trial was maintained at 1/2-inch, which is golf course fairway height and highly managed sports turf height of cut. We think it has great potential for highly managed systems in our region."

~ Dr. Doug Karcher, Professor of Turfgrass Science, University of Arkansas

"A lot of people have asked me where they could get it and that they want some. The color and the density of Tahoma 31 is unlike any other grass I've seen."

~ Justin May, golf course superintendent, Shangri-La Golf Club & Resort



TAHOMA 31[®] THE DATA

BERMUDAGRASS

Tahoma 31 Bermudagrass, (varietal name OKC 1131) was evaluated at Oklahoma State University - Stillwater, in regional experiments, and more extensively in the 2013 NTEP National Bermudagrass Test (NTEP, accessed in January 2017). The NTEP test provided data from 17 locations in 2013 and 2014, and from 19 locations in 2015.



MAJOR STRENGTHS AND COMPARATIVE PERFORMANCE

Tahoma 31 Bermudagrass is a high quality, interspecific hybrid turf bermudagrass that has exhibited exceptional winter survivability, a high level of drought resistance, and wide adaptation. It has demonstrated excellent establishment characteristics, fine texture, high turf density, early green-up, dark green color, and sufficient sod tensile strength for reliable commercial production.

ESTABLISHMENT RATE & WEAR TESTING

The NTEP test reported establishment rate data in 2013, indicating Tahoma 31 had excellent establishment ratings at each location. In KY2 (traffic trial), Tahoma 31 had an establishment rate similar to Celebration and Patriot but a quicker rate than Latitude 36, TifTuf, and Tifway (2013Table 29C).

VERTICAL GROWTH RATE Low vertical growth rate can be a desired trait in turfgrasses as this often leads to a reduced need for regular mowing and/or maintenance. A replicated field trial was established in 2014. Results in 2015 indicate that Tahoma 31 had a lower vertical growth rate than all of the industry standards tested.

SPRING GREEN UP In NTEP tests from 2014 - 2017, Tahoma 31 ranked at the top spot for early spring green-up among all vegetative bermudagrass cultivars tested in 16 states. Mean scores: Tahoma 31 (5.7), Iron Cutter (5.3), TifTuf (5.3), Latitude 36 (4.9), Tifway 419 (4.5), Celebration (4.4). Tahoma 31's early spring green-up reflects its superior winter hardiness.



TAHOMA 31[®]

BERMUDAGRASS

TURF QUALITY When turf quality [scale 1 – 9, 9 = maximum quality] was averaged over all locations of the NTEP test, Tahoma 31 was in the top performing statistical group in each year of 2014 through 2017 as indicated in the ‘2013-14 Progress Report’ and the ‘2015 Progress Report’, “2016 Progress Report” and “2017 Preliminary Report” (<http://www.ntep.org/bg.htm>).

DROUGHT RESISTANCE In the NTEP test, a field trial performed at College Station, TX, reported turf quality and living ground coverage under drought conditions in August to October 2015 (2015Table 18C, 2 pages). TifTuf and Tahoma 31 were the two top performers (Morris, 2016). In the drought test, percent living ground cover ratings of Tahoma 31 were the same as those of TifTuf for 8 of 12 events, inferior for 3 events, but superior for 1 event. Tahoma 31 exhibited better living ground coverage than Latitude 36 for 9 events and Patriot and Celebration for 3 events. Patriot had better LGC than Tahoma 31 on one date in the drought test.

WATER USE A field-based trial was conducted to evaluate the water use rates of 10 well-watered, bermudagrass (*Cynodon* spp.) genotypes in a completely randomized block design with three replications using mini-lysimeters with calcined clay as rooting media at the OSU Turfgrass Research Center, Stillwater, OK (Evapotranspiration Rates of Turf Bermudagrasses under Non-limiting Soil Moisture Conditions in Oklahoma, Crop

Science, May – June 2018, Amgain, et al.). Daily evapotranspiration (ET) rates were measured at pre-dawn by weighing the mini-lysimeters every 24 hours for 10 dates in 2013, 6 dates in 2014, and 8 dates in 2015. TifTuf consistently ranked in the highest ET group, whereas Tahoma 31 (Tahoma 31) consistently ranked in the lowest ET group. Averaged over the 24 dates in three years, Tahoma 31 used 18.0% or 0.89 mm d-1 less water than TifTuf.

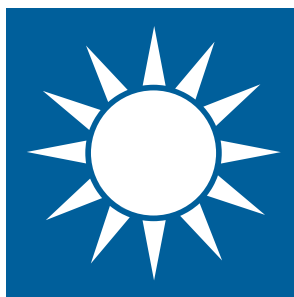
WINTER KILL The winter of 2013 - 2014 swept a polar vortex into the Midwest that created record low temperatures. Dr. Cale Bigelow, a professor of turf science and ecology at Purdue University, located in West Lafayette, Indiana, participated in the NTEP study. In a December 2019 article in Golf Course Management magazine, Dr. Bigelow was quoted as saying only 9 of 42 bermudagrasses tested survived with at least 50% ground cover by spring. Some 14 of the grasses completely died. By the end of the NTEP study, Tahoma 31 was rated by far with the greatest winter survivability in Indiana at only 4% winter kill. Mean scores in two states where winter survivability was measured, Indiana & Kentucky, confirmed Tahoma 31's top status in the three year study period, 2014 - 2017. Mean winter kill scores were recorded as Tahoma 31 (14.5%), Iron Cutter (48.7%), Latitude 36 (57.3%), and TifTuf (88.3%).

SHADE TOLERANCE Tahoma 31 was rated #1 in turf quality among major commercially- available bermudagrass cultivars in up to 63% shade. Results show the mean turfgrass quality across years 2018 and 2019 (Years 2 and 3 under 63% shade). These values are means across 6 rating dates in these two years and are presented with no statistical analysis. That being the case, it is highly likely several of these grasses are statistically equivalent. Other considerations are that plots received no traffic and were mowed at 1.5-inches once per week. In our opinion, Tahoma 31 is a great choice (among bermudagrasses) for partial shaded locations in the transition zone of the US, although clearly many of the newer grasses are an improvement over the old standard Tifway. Analysis of preliminary findings of the Stillwater location SCRI shade trial, Charles Fontanier, Ph.D., Assistant Professor - Turfgrass Science, Dept of Horticulture & Landscape Architecture, Oklahoma State University.



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**DROUGHT
RESISTANT**



**EARLY SPRING
GREEN-UP**



**SALT
TOLERANT**



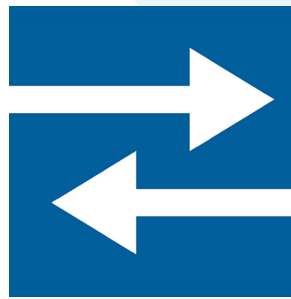
**SHADE
TOLERANT**



WEAR TOLERANT



COLD HARDY



ADAPTABLE

Fine textured and beautiful, Tahoma 31 Bermudagrass is well suited for use on golf courses, sports fields, and lawns.

Developed by **Oklahoma State University**



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