Turfgrass Performance in Asia: 2006 – 2011[1]

Micah S. Woods

[1] a presentation at the Sustainable Turfgrass Management in Asia 2012 conference, 12 March 2012, at Pattaya, Thailand

Various research projects have been conducted by the Asian Turfgrass Center over the past six years. This presentation gives a quick overview of interesting results in investigations of bermudagrass white leaf, soil amendments, Primo Maxx, salt tolerance and drought tolerance of seashore paspalum, and measurements of putting surface performance.

Bermudagrass White Leaf

This pathogen is one of the most unsightly problems to occur on bermudagrass turf. It is caused by *Candidatus* Phytoplasma cynodontis[2] and the symptoms are chlorosis of the plant, a bushy growing habit, and eventual death of the plant.

[2] Carmine Marcone, Bernd Schneider, and Erich Seemüller. 'candidatus phytoplasma cynodontis', the phytoplasma associated with bermuda grass white leaf disease. *International Journal of Systematic and Evolutionary Microbiology*, 54:1077–1062, 2004

Our research into bermudagrass white leaf was summarized at the Asian Turfgrass Field Day[3] in 2008. We have observed bermudagrass white leaf on golf courses throughout Southeast Asia. This is what is termed a *mollicute disease* and it is caused by a phytoplasma. It is spread by insects, similar to the way that diseases such as malaria are spread by insects. Fungicides do not control the phytoplasma. We have noticed three main points regarding this problem.

First, bermudagrass white leaf infections seem to be most severe on bermudagrass that is less than 2 years old. As the turfgrass stand matures, the number of infected plants seem to decrease.

[3] the entire 2008 field day book is available for download at www.asianturfgrass.com/turf-information.html

Second, infected plants die within 4 to 12 weeks after infection. We have grown isolated plants (Tifway 419 and Riviera) that are infected with bermudagrass white leaf, and all of the infected plants have died in less than 3 months. Most plants have died in less than 9 weeks. This provides some clues about possible control measures. We are not sure what insect spreads this phytoplasma. But if the insect can be controlled for an 8 week period, we expect almost all of the infected plants will die and there would be no new infections during that period. Therefore the problem may be able to be reduced if we can identify the insect vector and then control it.

Third, and perhaps most interesting, is that there seems to be different susceptibility to bermudagrass white leaf depending on which grass cultivar is used. We have measured the percentage of plot area affected (Table 1) by this pathogen on bermudagrass plots grown as fairway turf (Area 6 at our research area).

Cultivar	Mean % Plot Area Infected
La Paloma	88
Riviera	83
Savannah	71
Common	68
Tifgreen 328	64
Tifdwarf	24
Tifway 419	0
Moonlight	0
Mountain Green	0

Table 1: Percentage of plot area affected as measured on bermudagrass cultivars maintained at 15 mm mowing height from October to December 2007

Soil Amendments

SAND IS USED as the rootzone for most high-maintenance turfgrass sites, but sand is a poor growing medium for plants, holding little water or nutrients. Sands are therefore sometimes amended with organic or inorganic amendments to change the nutrient and water-holding characteristics of the rootzone.

We constructed plots of unamended sand, sand mixed with zeolite (which can increase the soil cation exchange capacity), sand mixed with two types of Perm-o-pore inorganic soil amendment (which can modify the soil's physical characteristics), and sand mixed with charcoal (which can modify both the physical and the chemical characteristics of the soil).

We planted half the plots with stolons of Salam seashore paspalum and half with Tifway 419 bermudagrass. During the grow in we measured the speed with which the grasses achieved full coverage of the plots. We also monitored the soil moisture content of the rootzones (Table 2).

Soil	Volumetric Water Content%
Sand + charcoal	19.0
Sand + Perm-o-pore80	15.6
Sand + Perm-o-pore530	15.4
Sand + Zeolite-high	14.9
Sand + Zeolite-low	14.8
Sand, unamended	12.3

Table 2: Average volumetric water content over two months in 2007 of soil amendment plots at the Asian Turfgrass Center Research Facility near Bangkok

The bermuda plots achieved full surface coverage faster (about 14 days earlier) than the seashore paspalum plots. The seashore paspalum plots had higher soil moisture content than the bermudagrass plots. The plots amended with charcoal had the highest soil water content; the unamended sand plots had the lowest soil water content. Amended plots achieved full surface coverage about 14 days earlier than did unamended plots. Once the grass achieved full coverage of the plots, we did not observe any differences between the different soil amendment plots.

Primo Maxx

IN EXPERIMENTS on manilagrass (*Zoysia matrella*), hybrid bermudagrass (*Cynodon dactylon* x *C. transvaalensis*), and seashore paspalum (*Paspalum vaginatum*), we found that application of Primo Maxx at label rates can reduce the dry weight of clippings by 50% or more over a one month period (Figure 1). In fact, our data show that the reduction in clipping production can extend for more than one month in some cases. Such a reduction in clipping production can reduce the need for frequent mowing and comes with the attendant benefit of reduced stress on the turf.

	Data shown are the dry mass in treated plots as a percentage of the dry mass in untreated plots. Primo Maxx application rate is in mL / square meter											
Rate	0.04	0.08	0.12	0.04	0.08	0.12	0.04	0.08	0.12	0.04	0.08	0.12
Days after treatment	Tifway 419			Salam seashore paspalum			Zoysia matrella + Salam			Zoysia matrella		
7	9	27	20	24	13	9	33	28	18	25	19	9
14	21	38	22	15	19	16	39	33	17	30	25	12
21	33	12	18	29	24	16	51	45	24	39	32	17
28	47	25	20	45	32	25	60	39	28	41	43	24
35	50	39	97	52	44	31	56	54	31	55	47	28
42	52	86	76	83	90	74	88	93	49	66	78	46
49	76	67	52	87	91	75	118	109	58	65	74	78
56	65	83	74	103	77	71	133	117	84	76	65	44

Figure 1: Dry weights of clippings collected by mowing at 15 mm each week as a percentage of the untreated control

Seashore Paspalum, Salt, and Drought

We applied salt, in the form of granular sodium chloride (NaCl), to various grasses. Seashore paspalum was the most tolerant of salt application, showing no phytotoxicity when salt was applied at rates up to 150 g m^{-2}. Bermudagrass turns yellow when salt is applied at that rate but generally recovers in about one month. It is difficult to control bermudagrass in seashore paspalum through application of salt. We have found that broadleaf weeds can generally be controlled with salt, but bermudagrass and goosegrass[4] (*Eleusine indica*) are able to recover from the damage caused by salt applications. If salt is to be used for selective weed control in seashore paspalum, I recommend applying sodium chloride as a granular product to wet foliage at a rate of about 150 g m^{-2}. Brosnan et al.[5] had success with this method in Hawaii to control *Paspalum conjugatum*.

In multiple dry-down experiments at the Asian Turfgrass Center Research Facility, we have observed that Salam seashore paspalum dies when supplemental irrigation is not provided. Adjacent plots of manilagrass and bermudagrass, growing in the same soil, and with irrigation similarly withheld, have been able to recover from the drought stress. In fact, the manilagrass and bermudagrass will overgrow the seashore paspalum over time. This has been documented in southern China[6] where a lawn of seashore paspalum was overtaken by manilagrass, and we observed this at the Research Facility

[4] J.T. Brosnan, J. DeFrank, M.S. Woods, and G.K. Breeden. Efficacy of sodium chloride applications for control of goosegrass (eleusine indica) in seashore paspalum turf. *Weed Technology*, 23(1): 179–183, 2009a

[5] J.T. Brosnan, J. DeFrank, M.S. Woods, and G.K. Breeden. Sodium chloride salt application provide effective control of sourgrass (paspalum conjugatum) in seashore paspalum turf. *Weed Technology*, 23(2):251–256, 2009b

[6] Xin-Ming Xie, You-Zhi Jian, and Xiao-Na Wen. Spatial and temporal dynamics of the weed community in a seashore paspalum turf. *Weed Science*, 57:248–255, 2009

in Thailand as well.

Turfgrass Performance on Putting Greens

Measurements of green speed and surface firmness have been made on hundreds of greens over the past six months. These data are summarized by grass species and additional detail is shown for the country at which individual readings were collected.

Figure 2 shows the stimpmeter reading, given in feet, for measurements made on seven grass species in six countries. A boxplot is shown for each species to summarize the data collected on greens of that grass, while individual data points are overlaid on the plot. Figure 3 gives the same information for the surface firmness data.

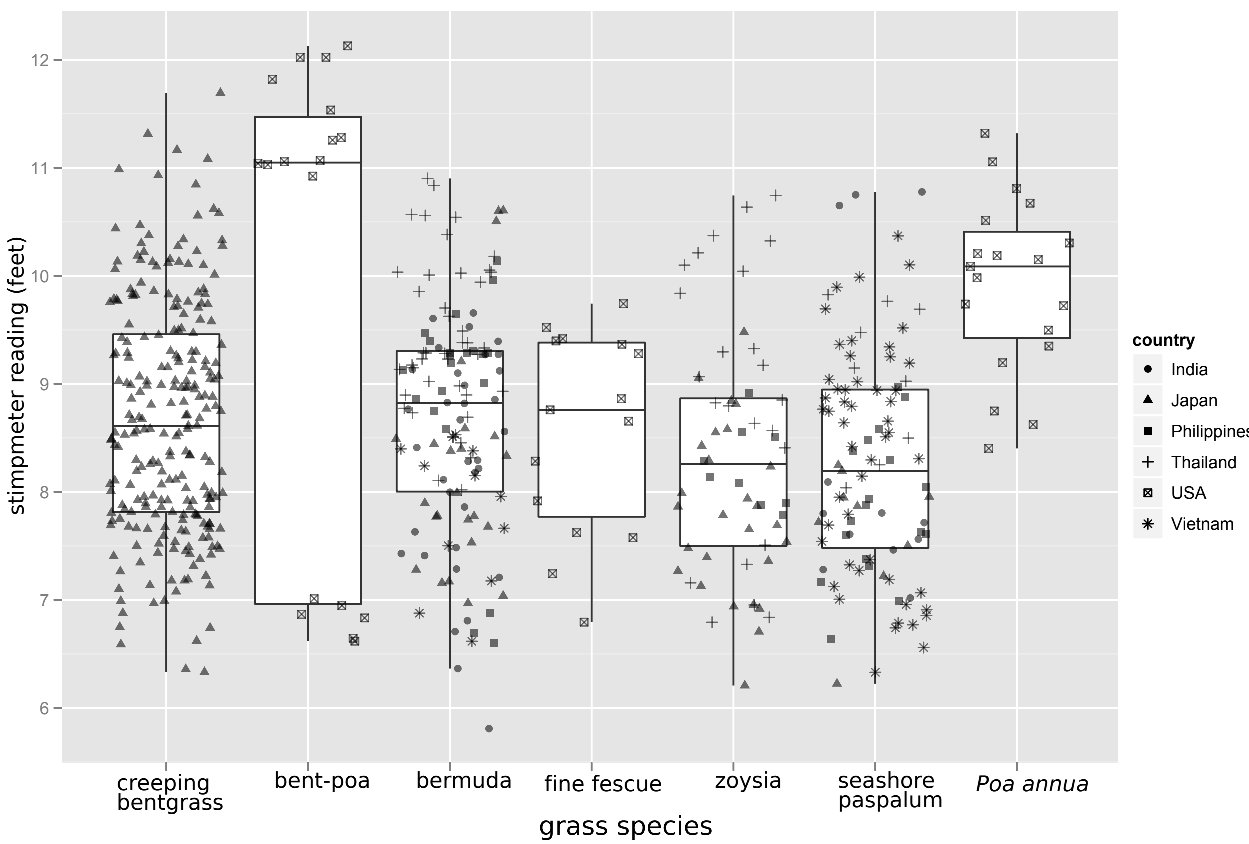

Figure 2: Stimpmeter reading in feet for measurements of green speed collected from August 2011 to January 2012

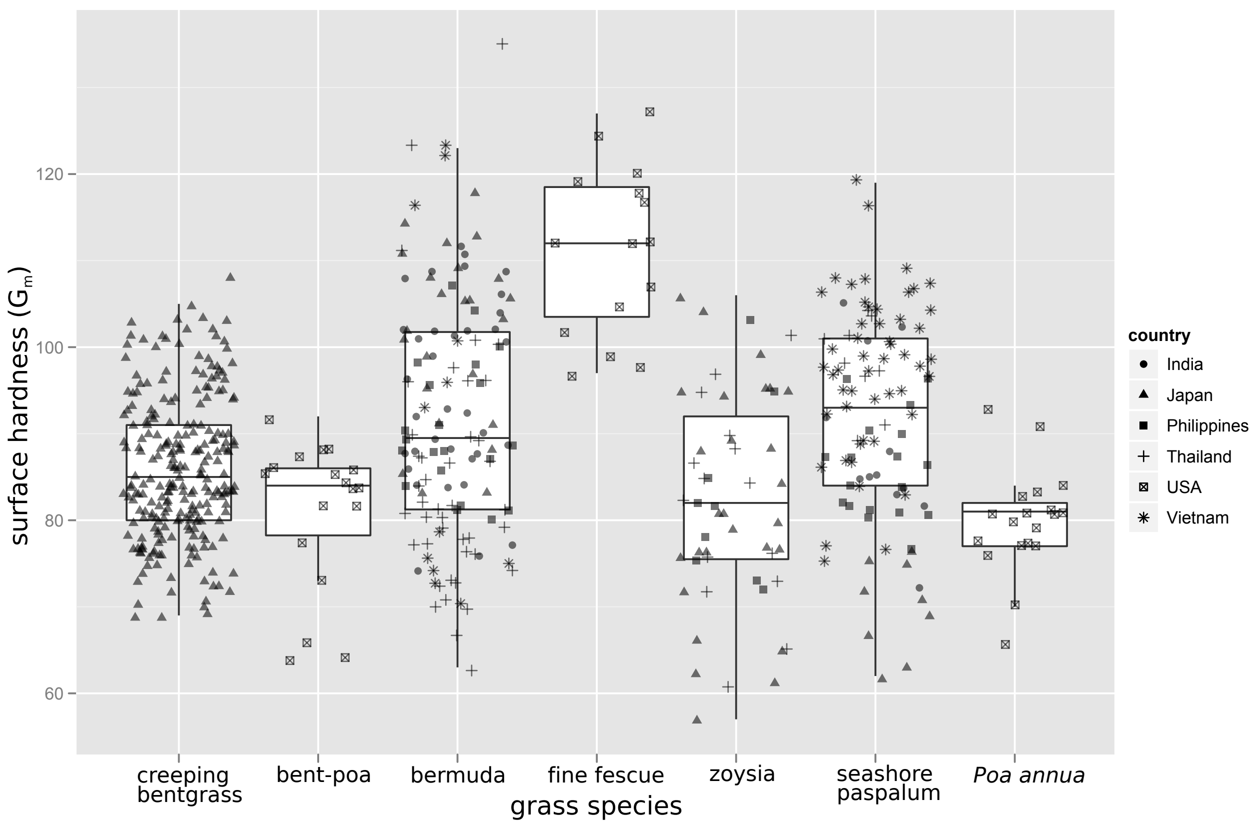

Figure 3: Clegg hammer reading (500 g hammer) for measurements of surface hardness collected on golf course putting greens from August 2011 to January 2012

References

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