

When It Comes To Turf Quality, Ask Those Closest To It.



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— Angus, Randy Moody's Black Lab



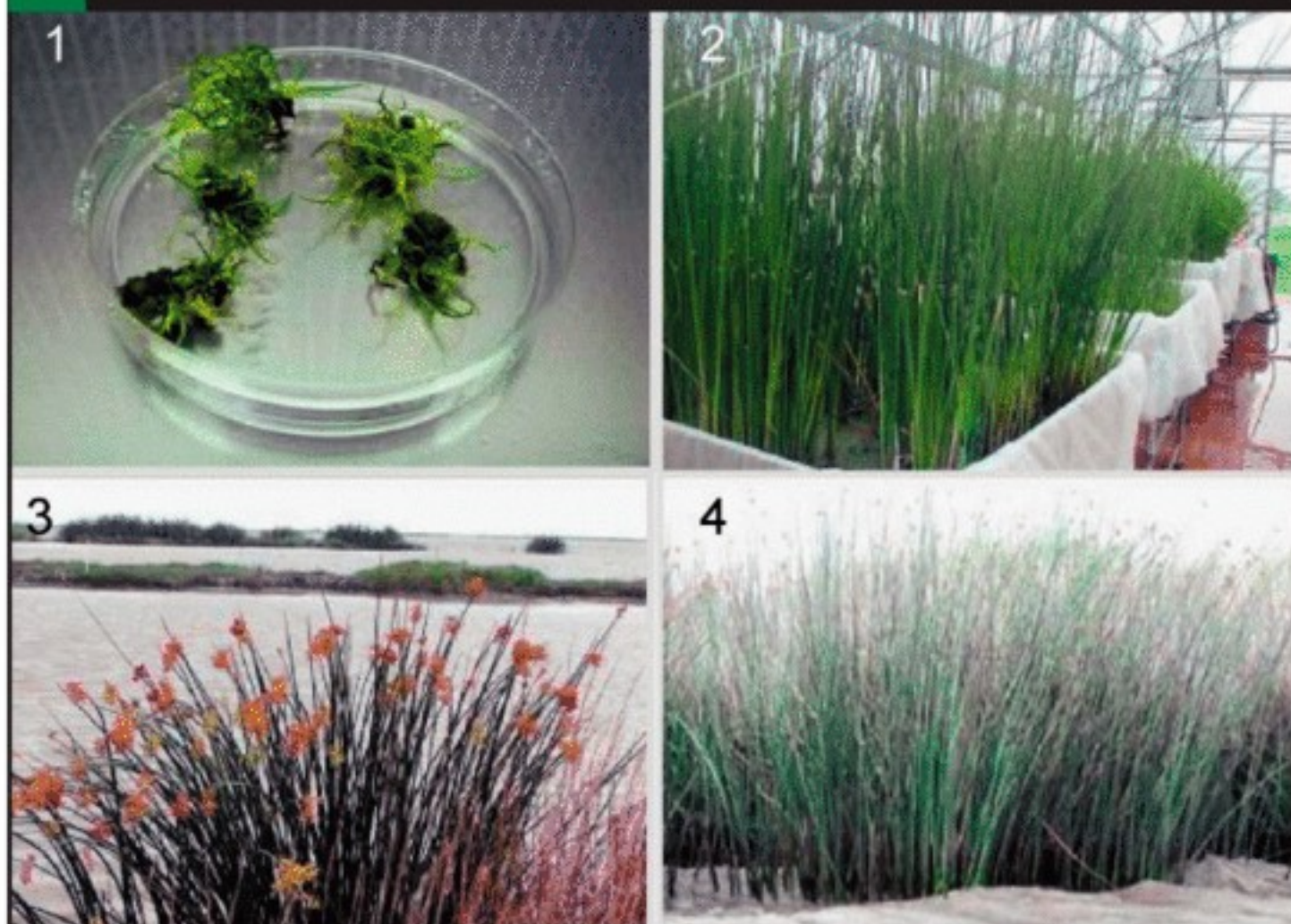
Slow-release Nitroform[®] fertilizer has made quite a positive impact on Superintendent Randy Moody and his dog, Angus, at Georgia's Longshadow Golf Club. "It's consistent, with no surge growth or flushes, so we save time and labor," says Randy.

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PHOTO A



Under appropriate laboratory conditions (1), individual cells are capable of self-regeneration into whole plants (2). A promising line, LA309, has been identified for potential release based on trials at a Great Lakes site (3 and 4).



JOHN DEERE

QUICK TIP

The key to a successful integrated pest management (IPM) program is to accurately scout diseases and insects. Rather than treating turf seasonally or based solely on symptoms, collect specimens of any pests or problems. This clear evidence will inform sound management practices. For more information on IPM, contact your John Deere Golf agronomic sales representative, or visit www.john-deere.com.

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systems from point and non-point sources of pollutants, and as a treatment area to remove toxic metals from wastewater, storm water runoff and chemical runoff. California bulrush, together with other plants such as cattail (*Typha angustifolia*), has the ability to phytoremediate contaminants from the water and soil (Hawkins et al., 1997; Murray-Gulde et al., 2005).

These plants can take up the hazardous level contaminants, including mercury (Hg), selenium (Se), lead (Pb), zinc (Zn), methyl (Me) and arsenic (As), from the water and soil and translocate them into various organs, such as roots, shoots and leaves. Colonies of California bulrush provide strong interwoven root masses that stabilize sediment surface and soil matrix and prevent erosion and re-suspension of the precipitated contaminants. Vigorous biomass of California bulrush can provide significant binding sites for these harmful elements, allowing these metals to be sequestered in wetland sediments in non-bioavailable forms.

When California bulrush was used in a wastewater treatment, bio-concentration factors (ratio between concentration of metal in the plant and in the water) of 1,911 for Hg, 9,593 for Se and

4,927 for As have been reported (Sundberg-Jones and Hassan, 2007). The ability to tolerate toxic metals varies among plants. In cases where natural vegetation cannot grow due to high levels of metal toxicity, California bulrush can be used as a cover plant to mitigate the problem until favorable conditions are achieved to allow re-establishment of natural vegetation.

Use for erosion control

California bulrush can be used for erosion control along golf course pond and stream shorelines, canal banks, levees and other areas of soil-water interface. Its colonies tend to grow parallel to and continuous along shorelines, or in unobstructed habitats in solid, somewhat circular, stands that may exceed an acre or more. Its stems effectively trap sediment and serve as a buffer to dissipate wave energy, thus enhancing the establishment of other vegetation along the shorelines.

When used as open-water barriers, California bulrush significantly dissipate wave energy, reduces suspended sediments, improves water quality and promotes diverse communities of submerged underwater aquatics. In highly impacted areas, such as Louisiana coastal wetlands where an unprecedented magnitude of coastal marsh loss occurs, better adapted and superior cultivars of California bulrush are needed. It can provide both short- and long-term vegetation.

When properly established and in the appropriate habitat, California bulrush will persist and potentially remain effective indefinitely. California bulrush has a relatively low tolerance to salinity and therefore is generally restricted to fresh and intermediate marsh habitats. Greater salt tolerance in California bulrush will increase its role in reducing coastal erosion control and restoring salt marshes.

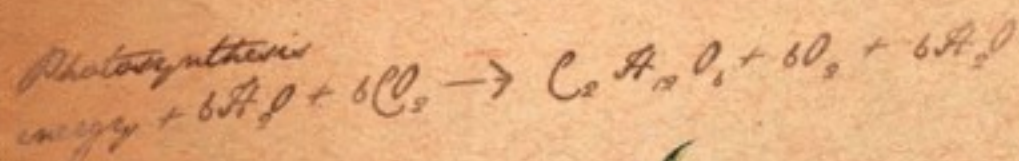
Genetically improved bulrush

Since natural variation found in California bulrush does not provide preferable levels of salt tolerance, novel plants need to be developed. In an attempt to improve salt tolerance, parts of actively growing flowers from one of the most tolerant lines were used to produce callus cultures on media containing growth regulators. This produced millions of break-free

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Rooted in Solutions

Symptoms of nutrient deficiency include:
Chlorosis, necrosis, reduced tillering,
lack of growth or, even loss of stand resulting
in weed invasion.



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 individual cells. Under appropriate laboratory conditions, these individual cells will be capable of self-regeneration into whole plants (Photo A — 1 and 2). Using this approach, what would require thousands of acres to grow millions of plants in a typical farm setting can substantially be reduced into laboratory-size petri dishes. Our cellular selection using millions of cells has yielded 384 lines generally regarded as salt tolerant. These lines are being grown in the greenhouse for further evaluation in coming years. These salt-tolerant mutants are not considered genetically modified organisms and, therefore, will not be subjected to a strict regulation associated with the use of genetically modified organisms. If these plants retain their salt tolerance as they did at the cell level, they will be readily available for use in coastal marsh restoration.

Promising line

A promising line, LA309, has been identified for potential release. These lines were selected based on replicated preliminary field tests at the Rice Research Station in 2004 and 2005, followed by multi-location trials in 2006 to 2008 at the Great Lake site (Photo A — 3 and 4). An additional testing site at Sweet Lake, Cameron, La., was added in mid-2008. In the preliminary field tests, a total of 48 bulrush ecotypes collected from marshes across Louisiana was evaluated in replicated field trials at the Rice Research Station.

Nine promising lines that have good spreadability, stem density, biomass accumulation and seed production were selected for multi-location trials in 2006 at the Great Lake site, and in 2008 at Sweet Lake.

In parallel to the field tests, greenhouse screening to determine the salt-tolerance level among these ecotypes was also carried out in the same years. After exposure in a salt concentration of 12 parts per thousand in continuous flooding for six months, eight survivors were recovered, increased in the greenhouse and included in the replicated multi-location trials together with the original nine lines.

Experimental line LA268 spreads fastest among the 48 tested accessions. Under a freshwater environment, LA268 spreads vegetatively with an average rate of 7.5 m² (square

meters) annually (Table 1). With an average height of 182.8 cm (18 cm taller than Restorer), LA268 has dark green hard stems with an average diameter of 1.3 cm. Mature seed has an average germination rate of 4 percent, shows dormancy and a portion of the seed remains viable for several years if the seed is left in the ground. Development of improved California bulrush lines will help in erosion control efforts, remediate metal toxicity and pollutant problems and increase the effectiveness of wastewater treatments.

Herry S. Utomo is assistant professor of molecular genetics and breeding, and Ida Wenefrida is an assistant professor at the Rice Research Station at the Louisiana State University AgCenter in Rayne, La.

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QUICK TIP

The single most stressful thing we do to turf is mow it. It is unnatural, greatly hinders the biological needs of the plant and is one of the most talked-about variables in turfgrass management. However, mowing offers us a surface capable of meeting players' demands. Turf, like other biological entities, attempts to find a way to cope with stress — especially when we identify the compromised needs and address them. Far too often the most limiting factor for plant performance under stressful mowing conditions is nutritional imbalance and deficiencies. Address this and mowing stress is alleviated substantially. Read more at www.floratine.com.

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December THIS MONTH'S HEALTH TIP



Taking simple precautions for the upcoming holidays can ensure a happy, healthy time for you and your dog. Don't feed pets holiday treats or leftovers. Some foods such as chocolates, alcohol, uncooked bread dough, grapes and raisins can be life-threatening. Keep ribbons, tinsel, flower arrangements, electrical cords and holiday decorations away from pets. And don't forget about live trees; place them in a room away from your dog. To stop a Christmas tree from falling over, place a hook in the ceiling and use some nylon yard to attach to the tree. This will prevent falling over.

Tequila Rose and Stoli Blue. Their owner is Tyler Koser, the director of agronomy at Seven Canyons Golf Club in Sedona, Ariz. (Photo by: Tina Koser)



Improving the Way Professionals Care for Turf

Christmas list

Editor's note: This is Mark Luce's last Out of Bounds column. We will welcome Geoff Shackelford to the back page next month, but Luce will continue to write for Golfdom in various capacities.

Dear Santa, So, I guess it's been a while. I am not so good at math, but if I am not mistaken, I last sent you a missive in 1978. That was one year after I was ridiculed in Mrs. Bridgewater's second-grade class. You see, our teacher said, "No one lives at the North Pole." But I was ever eager to challenge authority, so I claimed otherwise: "Santa Claus does," I retorted. Everyone laughed.

Well, that did cause some moments of doubt and pain, and I now must sheepishly admit that for a couple of decades (give or take a few years), I wasn't necessarily convinced of your existence. I'm sure you have heard such poppycock before, but let me say that with the birth of our first son and my repeated reading of "The Polar Express," I realized the error of my ways.

The problem, of course, was that I didn't really know that if I heard "the bell," which Chris Van Allsburg so poignantly refers to in "The Polar Express," my holiday spirit would return, replete with working elves, the

IT'S BEEN A WHILE SINCE I LEFT COOKIES, BUT I'VE BEEN FAIRLY NICE

BY MARK LUCE

patter of reindeer, and general warmth and love.

And, while I am confessing, I guess I might as well admit that the movie "Elf" also helped diminish my doubt — especially considering you landed in Central Park and employed the help of Will Ferrell and Bob Newhart. After all, I reasoned, how could someone who supposedly doesn't exist be so smart as to utilize two hysterically funny men from such diverse (and vital) sides of the comedic street.

Hopefully, Santa, you can see where I am coming from, and accept my humblest apology for my years in the wilderness. With this *mea culpa* addressed, perhaps we can move forward. Below you will find not only the inventory of my naughty and nice, but one thing I meekly request under our permanent tree (I know, I know, but the needles were just too much).

Naughty — I am not good about ironing my clothes the night before. I also, on a couple of occasions, perhaps had one more bourbon than I needed. I also wished a couple of times that rain would wash out some of my son Miles' soccer and/or T-ball



games. Sometimes, my column isn't on time.

Nice — I routinely take the boys hiking and have been active in the Cub Scout troop. I helped coach soccer and basketball, and I wrote a passel of letters of recommendation for prospective college kids. I volunteered at a local food bank. I treat my lovely wife with courtesy, respect and love. And I redid the entire living room.

So, if you could, I would really appreciate a Canon EOS Rebel XS 18-55IS digital camera. I would like to cultivate photography as a hobby, and to do so, one needs solid gear.

Please recall my address: 113 E. 109th Terrace, Kansas City, Mo., 64114. I will leave out cookies, Gatorade and a bag of Four Cheese Doritos for you and the crew.

Mark Luce lives in Kansas City, Mo., where he wishes you a happy holiday. He can be reached at msluce@everestkc.net.

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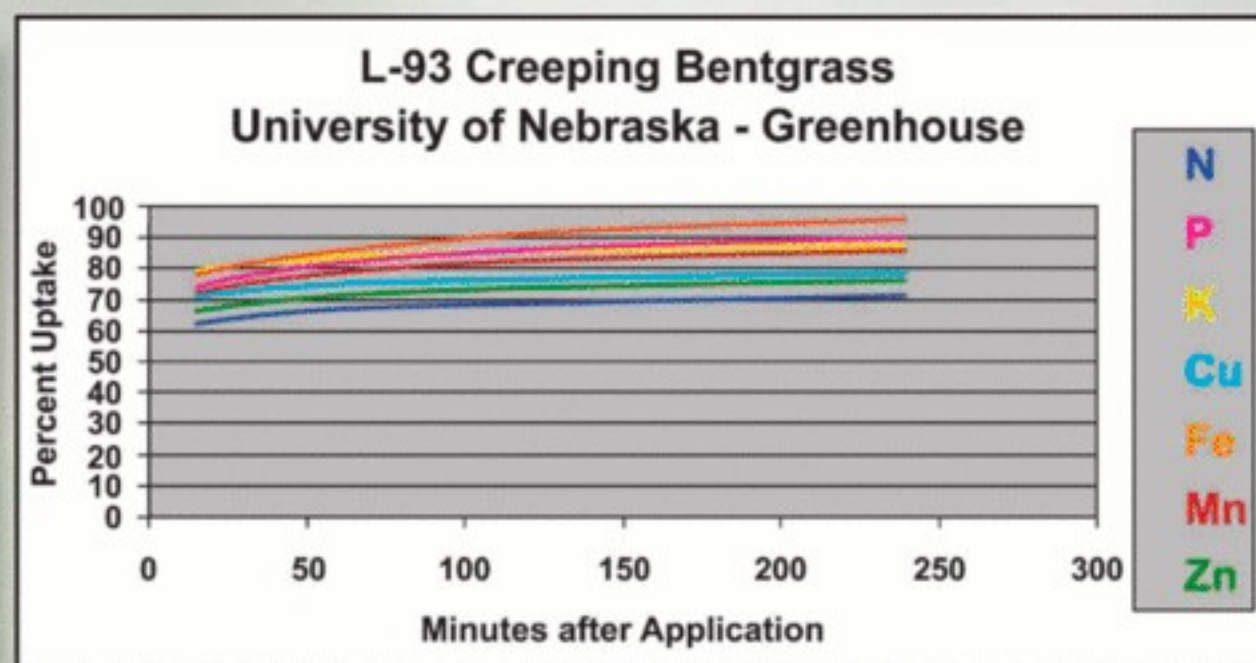
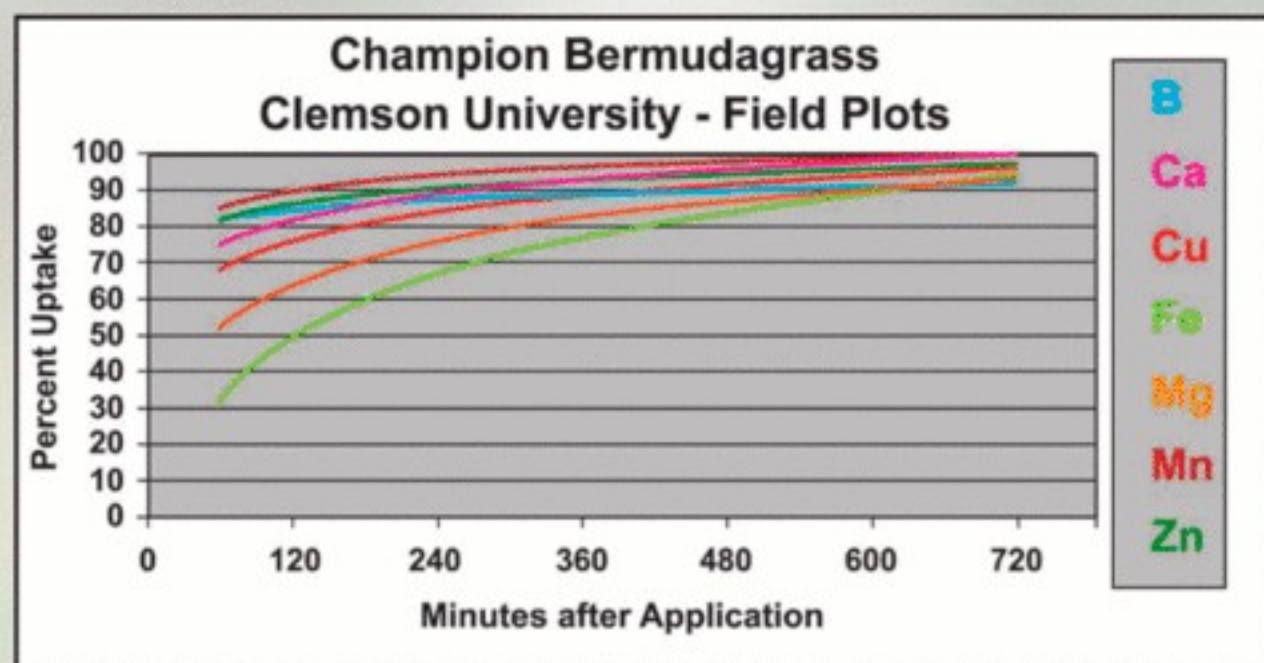


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