

Two More Unconventional Grass Families to Know and Love

By Doug Brede, Ph.D.

Editor's note: This article is the third in a series for TurfgrassTrends describing in detail two families of little-used turfgrasses from among the hundreds you can know and grow.

Charlie Gouveia had a problem: His maintenance department was slowly poisoning his turfgrass and there was nothing he could do to stop it.

For many years, Gouveia was the Maintenance Director for the Illinois Department of Transportation, responsible for the miles of urban and rural thoroughfares throughout the state. It was Charlie's job to maintain the green ribbons along byways from Winthrop Harbor on the Wisconsin border north of Chicago, to Future City, Illinois, at the extreme southern tip of the state.

Years of winter deicing salts were taking

their toll. In metropolitan areas, the 40 feet of turf next to the pavement was slowly dying, giving way to mud and weeds. Gouveia considered all possible solutions, most of which were either prohibitively expensive (digging out and replacing the contaminated soil) or blatantly dangerous (abandoning their winter salt applications).

Instead, he turned to seed specialist, Mark Grundman, for advice on unconventional grasses. After considerable study and testing, Grundman and Gouveia discovered a salt-tolerant turfgrass that could persist in this hostile environment. Later in this article, I'll explain how a Colorado professor came to their aid to save Illinois' roadsides.

In this edition of "Unconventional Grasses to Know and Love," I'm going to highlight two grass families that have been used extensively on American roadsides — the alkaligrasses and the lovegrasses — and explain where they can function for higher managed turfs, such as golf courses and sports.

TABLE 1

Survival of Lemmon and weeping alkaligrass over a 15-month period, in a sand-based experiment by Ali Harivandi, et al. (8). The two species were watered with concentrations of synthetic seawater every 15 days. The experiment demonstrates that these salt-tolerant grasses can bear pure seawater irrigation for short periods and can withstand 50% seawater irrigation for extended periods.

% sea water	Growth at 4 months	Months until 90% dead
0%	Normal growth	Indefinite
25%	Normal growth	Indefinite
50%	Retarded growth	More than 15 months
75%	Retarded growth	11 months
100%	Retarded growth	4 to 7 months

Salt? No problem

Stan Metsker is not a scientist or plant breeder. But he knew something good when he saw it. Metsker was the superintendent at Boulder Country Club, Boulder, Colorado, back in the 1970s. Located on the eastern fringe of the Rockies, Metsker's course — like many golf courses of the Plains — had elevated salt levels in the soil and irrigation water.

One warm day when the majority of his golf course was experiencing the first tell-tale signs of salt stress — a general purpling of the blades — Metsker noticed a particularly vibrant patch of grass on one fairway, seemingly unfazed by the white, salt-encrusted soil.

Metsker contacted Jesse Fults, a professor at Colorado State's Weed Lab, who identified the grass as weeping alkaligrass (*Puccinellia distans*). Fults took samples of the grass and began raising test quantities of seed.

At about the same time, Jackie Butler, a turf professor at the University of Illinois, was making the move to Colorado State University. Butler was aware of Gouveia's salt problems on Illinois roadsides. Butler later conducted many of the early turf evaluations of Metsker's alkaligrass strain, which was released in 1979 as the variety 'Fults.'

Three species of alkaligrass

Many people have heard of Fults weeping alkaligrass, but most don't know that there are actually three similar but distinct species of alkaligrass with adaptation to turf. Of them, only weeping alkaligrass (*P. distans*) is not a native to North America. The other two are native to the Great Plains and West

Early on, botanists believed alkaligrass was a *Poa* – a direct relative of Kentucky bluegrass. In fact, you'll find it listed that way in early textbooks. That's because unmowed plants of alkaligrass bear an eerie resemblance to bluegrass: They have the same plant shape and size, the same boat-shaped leaf tips, and the same parallel light lines on either side of the blade midrib (see Fig. 2).

Unmowed, weeping alkaligrass grows to about 16 inches tall. Lemmon's and Nuttall alkaligrass are slightly taller, maturing at one to three feet. I've seen claims in the literature that alkaligrass can withstand "mowing down to one-half inch." One writer even claims it can be used for winter putting green overseeding (7). My experience has been that alkaligrass can persist down to about one-inch cut and no lower. It does its best work at traditional lawn heights of two to three inches. Under mowing its leaves resemble creeping red fescue more so than bluegrass.

Alkaligrasses do not need salt to grow. True halophytes require a jigger of salt as part of their diet. Alkaligrass simply becomes more competitive as the level of salt rises, while traditional turfgrasses

become weaker and weaker. Soils with a high saline content will skew a mixture of alkaligrass into a nearly pure stand. On the converse, in unsalty soils, alkaligrass will virtually disappear from mixtures with ryegrass and bluegrass. Some turf managers routinely add a component of alkaligrass to seed mixtures to insure against future salt problems, either from deicing products or from effluent irrigation.

Weeping alkaligrass reportedly has the highest salt tolerance of the three species – able to withstand soil-paste EC's of 46 dS m⁻¹. David Major, in his graduate thesis at Cal. Poly (10), found that alkaligrass could routinely tolerate EC's "in the 50's." Even short-term irrigation with undiluted seawater is possible. Seashore paspalum (a warm-season grass) has similar tolerance. Only saltgrass (*Distichlis* spp.) – a rather stemmy, unattractive turfgrass – has better salt tolerance. Lemmon's alkaligrass has the least salt tolerance of the three species, but it is still greater than that of bermudagrass (2).

Tony Koski (3) says alkaligrass; Greens up early in the spring, earlier than bluegrass, usually in late March (in Colorado), retains its color well into late fall, exhibits summer dormancy similar to fine fescue – it goes dormant in hot weather regardless of water status.

As its name implies, alkaligrass prefers a basic pH of 7 to 8 and will tolerate even higher values. It seems to grow well in neutral or mildly acid pH's also.

Its bluish-green color becomes darker under increasing salt or alkali.

Seeding rates for turf plantings are 1 to 3 lbs. per 1000 ft². Considerably lower rates can be used for soil stabilization or vista-type plantings, in the range of 10 lbs./acre, when used in conservation mixtures. Early fall is its ideal sowing time.

Seedlots may contain some annual plant forms; these die out the first year and perennial forms later dominate the stand.

Test trials

I'm usually suspicious of greenhouse studies when it comes to turf. Not much commercial turfgrass is grown in greenhouses. But when other forms of research are

absent, they serve as a good starting point for inquiry.

Ali Harivandi and his colleagues (8) performed a neat greenhouse study on the tolerance of two alkaligrasses toward high levels of salt (Table 1). For the most part, they found that the two species, weeping and Lemmon's alkaligrass, responded similarly at low to moderate salt levels. Rapid germination occurred even in 50% seawater. Harivandi gave a slight edge to weeping alkaligrass over Lemmon's in enduring prolonged salty conditions. He also reported that mature plants handled salt better than seedlings.

A greenhouse study at the University of Nebraska compared alkaligrass with five popular turfgrass cultivars (Fig. 3). Ed Kinbacher and his associates (9) rated turf quality for more than two months, while subirrigating their pots with 0.8%-NaCl solution.

The salt effect is seen in the drop-off of performance over time. 'Adelphi' Kentucky bluegrass, the most salt-sensitive cultivar, steadily declined in quality as it endured saltwater. Alkaligrass, on the other hand, remained constant over the test period. Even buffalograss – a tough warm-season prairie species – declined sharply over time in quality.

Of course, the real proof-of-the-pudding comes from outdoor studies, like the one conducted at the Central Highlands Golf Club in Alberta, Canada (11). In this study, C.E. Miluch of Olds College tested 6 grasses under naturally saline conditions (Fig. 4). The plots were maintained at 1.5-inch cut for four years. Miluch found that alkaligrass, red fescue, and tall fescue performed the best. Crested hairgrass and the wheatgrasses were inferior in quality.

Results in Figure 4 show averages over

Grass	Growth habit and comments
Weeping lovegrass	Weeping lovegrass has become the gold standard of cascading grasses on slopes, and, if anything, has been over-used for that purpose. Medium-green, fine bladed foliage, turning light to dark green by autumn. Retains slender, seedless stalks into early winter. Acid soil tolerant. Sunlight benefits seed germination. Starts growing in mid to late spring. Relatively poor wildlife feed but good cover. Tolerates mowing as turf as long as it's above 6 inches (15 cm).
Boer lovegrass	More drought tolerant than weeping lovegrass but lacks cold tolerance. Develops chlorosis on alkaline soils. Sunlight and shallow planting benefit seed germination.
Plains lovegrass	Shorter-growing ornamental for dry, low humidity sites. Tall gray to bronze-tipped spikes, turning reddish in alkaline soils.
Lehmann lovegrass	A low maintenance grass for drier sites. Shorter growing than weeping lovegrass. Seed germinates readily with no dormancy problems. Ideal germination temperature 60 to 100 F (14 to 36 C). Its creeping habit makes for better erosion control than weeping lovegrass.
Wilman lovegrass	Desert grass. Good germination. Unique seedheads resemble rattlesnake rattles.
Sand lovegrass	Wispy pink seedheads. Drought hardy and persistent. pH tolerant down to 4.0. Cool, moist conditions for 6 weeks needed for germination. Will tolerate moist, sandy soils. Greens up as much as 2 weeks earlier than other warm-season grasses.
Atherstone lovegrass	A finer leafed alternative to weeping lovegrass. Some ecotypes have stolons but most are bunch-type. Larger, more vigorous plants than Lehmann or weeping lovegrass, but with the same weeping habit. Good seedling vigor and cold tolerance.
Nuttal alkaligrass	Tolerant to flooding, poor drainage and alkaline soils. Smooth, yellow-green foliage.
Weeping alkaligrass	Persistent, stemmy turfgrass. Widely adapted. Sometimes becomes a weed.
Lemmons alkaligrass	Prefers moist soils. Has problems with sluggish seed germination. Cool, moist conditions favor germination.

the duration of the trial. They do not document the declining quality of the red fescue over the course of the study. Miluch concluded that "the trend appears to be that the red fescue declined in quality while the alkaligrass maintained a more consistent quality."

In summary, alkaligrass is a cool-season bunchgrass with the best salt tolerance of any improved turfgrass. Seed supplies of weeping alkaligrass are plentiful and inexpensive, and quantities of the two native species, Nuttall and Lemmon's alkaligrass, can also be found through the reclamation grass seed trade.

Love, stink in the same family

Take a drive along Interstate-40 between Raleigh, NC and Oklahoma City and you're bound to see more weeping lovegrass than any other grass. Weeping lovegrass is a member of one of the largest clans of warm-season grasses: the Eragrostis. It is ideally suited to the southern Transition Zone climate of the US and similar climates throughout the world.

Weeping lovegrass (*E. curvula*) originated in South Africa; Boer and sand lovegrass are native to America (5).

The Eragrostis genus, which takes its name from Eros, the Greek word for love, is comprised of some 250 species of annual and perennial grasses (4). By the way, if you're thinking what I'm thinking, bear in mind that the lovegrasses are not ideally suited for outdoor whoopee, due to the stiff, rather abrasive leaves. Most have narrow, upright or weeping leaves, with a panicle seedhead similar to that of *Poa* (bluegrass) (Fig. 2).

The majority of Eragrostis are bunchgrasses, but a few, like Lehmann lovegrass, have rhizomes and even stolons (see Table 2).

Many of the Eragrostis are desirable agricultural grasses, useful for turf, ornamental purposes, soil stabilization, or wildlife. A few, like *E. cilianensis* (stinkgrass), are serious weeds. Stinkgrass is a prevalent summer-annual weed throughout much of America, noteworthy for its foul odor emitted when mown.

Weeping lovegrass is prized for its grace-

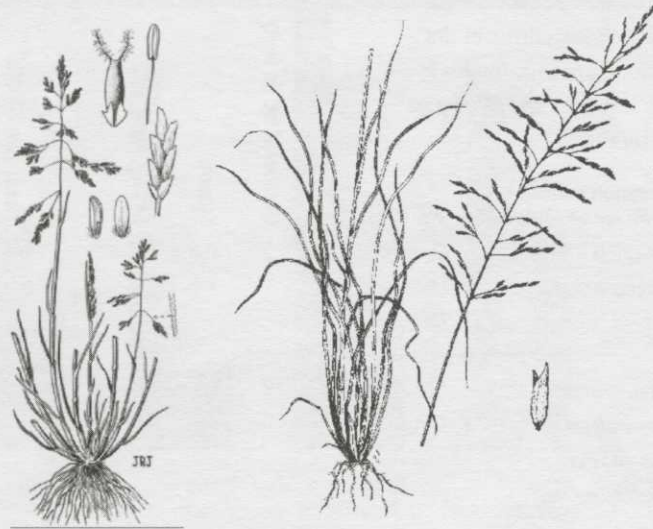


Figure 2. Plant shape and appearance of weeping alkaligrass and weeping lovegrass. Left-*Puccinellia distans*, or Weeping alkaligrass. Right-*Eragrostis curvula*, Weeping lovegrass

ful, cascading appearance on slopes, and tight binding of soil from its deep, fibrous roots. As a result you'll find it spec'ed in many a southern low maintenance turf seed mix, in plantings from hillslopes surrounding putting greens, to roadcuts along Appellation highways.

Lovegrass has a small seed, similar in size to Kentucky bluegrass. Yet it germinates with remarkable vigor, comparable with perennial ryegrass. More importantly, it germinates reliably under some pretty adverse conditions. That fact has endeared it to builders and landscape architects who can plant it and not worry whether or not it will fill.

The other species of lovegrass are not as reliable in germination. Sand lovegrass is a native grass, more drought tolerant than weeping lovegrass. But like some of its cousins, its germination is somewhat erratic. Bob Ahring, professor emeritus at Oklahoma State University, notes that "a full stand [of sand lovegrass] may be obtained the second season or even later if conditions are unfavorable in the season of planting (1)."

The Association of Official Seed Analysts recommend prechilling the seed for six

TABLE 2

Plant characteristics of the major agronomic species in the lovegrass and alkaligrass genera

Common name Latin name /Authority	Varieties	Native to U.S.	Unmowed ht. (in feet)	Season	Growth habit	Seeds per 1000lb.	Min. precip. (inches)	Cost rating	Seed availability	TOLERANCES				
										Wetland	Salt	Alkaline	Clipping	Shade
Weeping lovegrass <i>Eragrostis curvula</i> (Schrad.) Nees.	Consol, Ermelo, Morpa	No	3	Warm	Bunch	1463	17	\$	Excl.	No	Yes	No	Fair	Fair
Boer lovegrass <i>Eragrostis curvula</i> (Schrad.) Nees. var. <i>conferta</i> Stapf	Catalina, OTA-S	No	3	Warm	Bunch	3000	12	\$	Good	No	No	No	Mod.	Fair
Plains lovegrass <i>Eragrostis intermedia</i> Hitchc.	—	Yes	2	Warm	Bunch	3500	11	\$\$	Good	No	No	No	n/a	Fair
Lehmann lovegrass <i>Eragrostis lehmanniana</i> Nees.	A-68, Cochise (hybrid), Kuivato, Puhuima	No	2	Warm	Rhizomes & stolons	4245	12	\$	Good	No	Yes	Yes	Mod.	Fair
Wilman lovegrass <i>Eragrostis superba</i> Peyr.	Palar	No	4	Warm	Bunch	1100	12	\$\$\$	Poor	No	Yes	Yes	Mod.	Fair
Sand lovegrass <i>Eragrostis trichodes</i> (Nutt.) Wood	Bend, Mason, Neb. 27	Yes	3	Warm	Bunch	1779	12	\$	Good	No	No	No	Fair	Fair
Atherstone lovegrass <i>Eragrostis trichophora</i> Coss. & Dur.	Cochise (hybrid)	No	3	Warm	Stolons	n/a	10	\$	Good	No	No	No	n/a	Fair
Nuttal alkaligrass <i>Puccinellia airoides</i> (Nutt.) Wats. and Coult.	Quill	Yes	2	Cool	Bunch	2789	14	\$	Good	Yes	Yes	Yes	Mod.	Good
Weeping alkaligrass <i>Puccinellia distans</i> (L.) Parl.	Chaplin, Fults, Salty	No	1	Cool	Bunch	1200	15	\$	Excl.	Yes	Yes	Yes	Tol.	Good
Lemmons alkaligrass <i>Puccinellia lemmoni</i> (Vasey) Scribn.	—	Yes	1	Cool	Bunch	1027	—	\$	Good	No	Yes	Yes	Mod.	Good

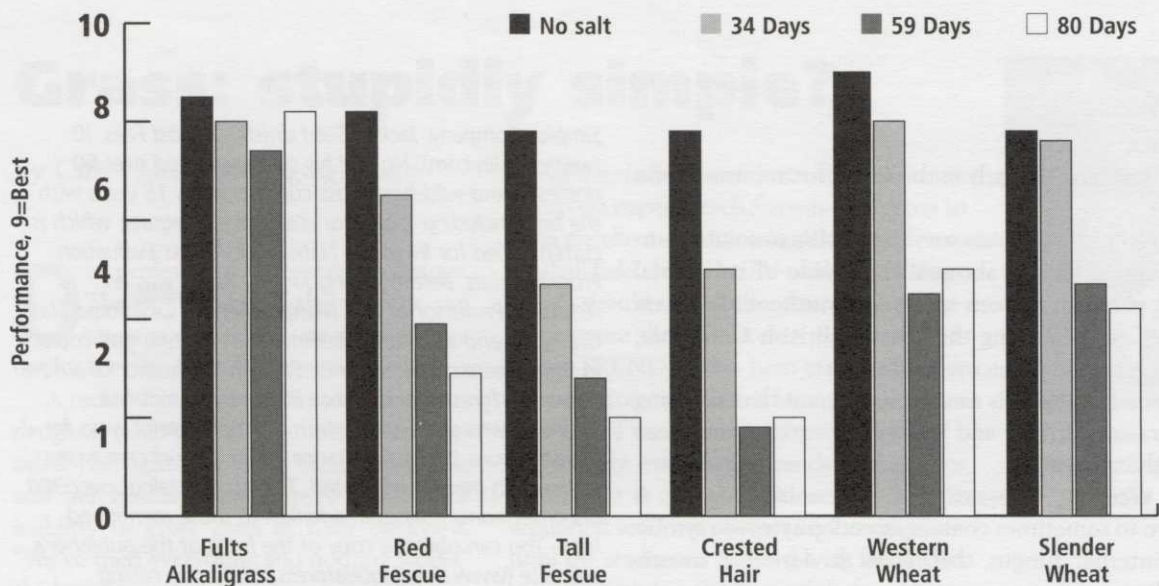


Fig. 3. Salinity trial at the University of Nebraska (9), showing the continuing tolerance of weeping alkaligrass to salt. Ten replicates of each variety were grown in greenhouse pots, watered with 0.8% NaCl salt solution. The turf was visually rated for more than 2 months (the rating dates are shown in the lower-left corner). The experiment was repeated using calcium salts. Results of the two salts were similar, with one exception: 'K-31' tall fescue was more salt tolerant to NaCl than 'Nugget,' but Nugget was more tolerant to CaCl₂.

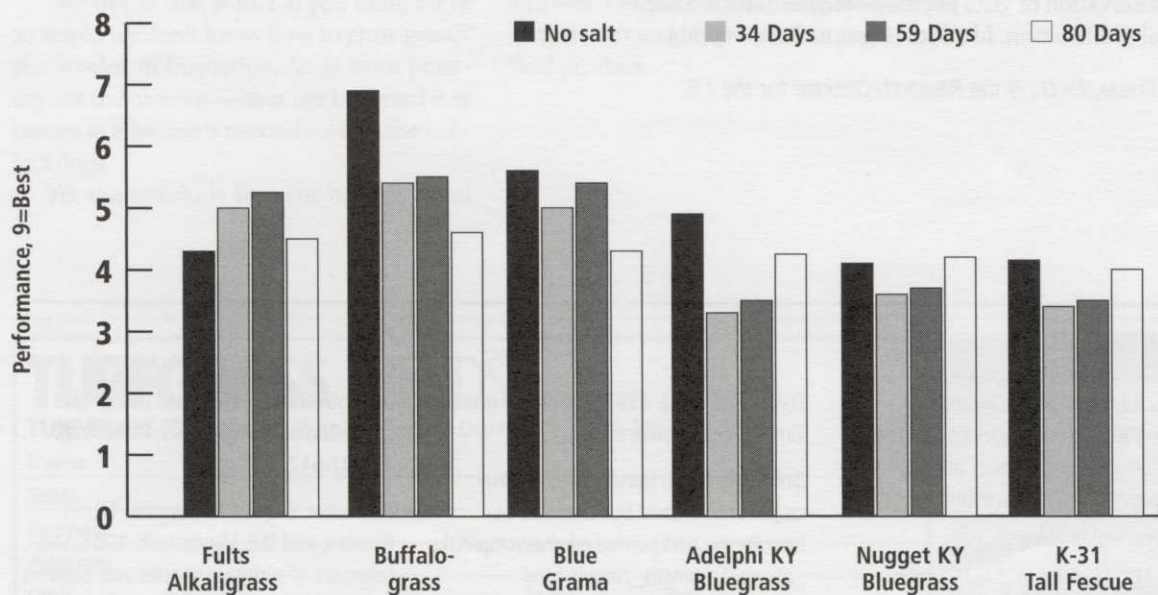


Fig. 4. Salinity trial at the Olds Central Highlands Golf Club in Olds, Alberta, Canada (11). A total of 12 cultivars were tested under saline conditions of 7.1-mmho/cm EC (the EC was measured at the initiation of the test). The graph above shows the cultivars: 'Fults' alkaligrass, 'Boreal' strong creeping red fescue, 'Crewcut' tall fescue, 'Barkoel' crested hairgrass, 'Walsh' western wheatgrass, and 'Highlander' slender wheatgrass. LSD0.05 values were 0.46, 0.51, 0.71, and 0.36 for color, density, ground cover, and overall, respectively.

weeks and then using the chemical KNO₃ to help break the seed dormancy. This procedure has discouraged more than one potential user from trying this grass.

C.D. Foy and his colleagues (6) at the USDA in Beltsville, MD, have tested weeping and Lehmann love-

grass for use on acid soils. They found that the variety 'Morpa' could withstand acid mine spoilage of pH 3.5. Other varieties and common lovegrass were able to tolerate down to pH 4.3.

Other characteristics of weeping lovegrass and its

relatives:

- Starts growth early in the spring for a warm-season grass.

- Weeping lovegrass survives in climates with temperatures generally above 0°F. Outside of its normal range, plants have been spotted in southern Maine, on Cape Cod, and along the coast of British Columbia, wherever suitable microclimates exist.

- Sand lovegrass is more cold tolerant than weeping lovegrass; Lehmann and Wilman lovegrasses are more drought tolerant.

- Weeping lovegrass, like perennial ryegrass, is known to sometimes contain an endophyte — a symbiotic internal fungus that gives it desirable insect-repelling properties.

- Lovegrass is managed best in pure stands, because its explosive seedling vigor tends to force out competitors. However, it can be combined with bluestem or other taller prairie grasses for a naturalized appearance.

- Seeding rates of 1 to 10 lbs. per acre are common for conservation or vista plantings. Higher rates are used for soil stabilization. Ideal sowing time is late spring.

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Simplot Company, Jacklin Seed division in Post Falls, ID (www.jacklin.com). He and his staff have bred over 60 domestic and wild-type grass cultivars in his 15 years with the firm, including 'Liberator' Kentucky bluegrass, which is currently tied for #1 in the National Turfgrass Evaluation Program trials. Before joining Jacklin, Brede was an Associate Professor of Turf Management at Oklahoma State University and assistant superintendent for two golf courses in southwestern Pennsylvania. Brede is the author of a new book, "Turfgrass Maintenance Reduction Handbook – Sports, Lawns and Golf," which describes useful ways for lowering your turf maintenance – making turf care easier rather than more complicated. The book catalogs over 300 unconventional grasses in addition to those mentioned here. You can obtain a copy of the book at the publisher's web site (www.sleepingbearpress.com) or by calling 734/475-8787.

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