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# Seashore Paspalum

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Seashore paspalum (*Paspalum vaginatum*) is a prostrate, perennial turfgrass indigenous to tropical and coastal areas worldwide. It is highly tolerant of various environmental stresses. Compared to bermudagrass (*Cynodon* spp.), seashore paspalum can form a higher quality turf in reduced light conditions, in soils ranging in pH from 3.6 to 10.2, in waterlogged soils, and with fewer applications of nitrogen fertilizer. It tolerates soil salinity levels as high as 54 $dSm^{-1}$, a level at which most horticultural crops cannot survive.

Diversity within the species is significant: both coarse-textured (used for roadsides) and fine-textured ecotypes (used for golf courses and other landscapes) exist. Breeding efforts initiated in the late 1990s at the University of Georgia have led to the development of improved cultivars for use on golf courses, athletic fields, and other landscape areas (Photo 1). These cultivars will be discussed throughout this document.

Morphologically, seashore paspalum is similar to bermudagrass (*Cynodon* spp.). Both species spread rapidly by stolons and rhizomes to form a fine-textured, dense turf with a deep root system. Similar to hybrid bermudagrasses, seashore paspalum is tolerant of low mowing heights (< ½ inch). Stolons and rhizomes of seashore paspalum are often much thicker than those of hybrid bermudagrasses (Photo 2). Seashore paspalum cultivars are also darker green than most hybrid bermudagrasses (Photo 3). Furthermore, seashore paspalum foliage

**1. Seashore paspalum golf green in Kailua-Kona, Hawai'i**

*This replaces a 1998 publication of the same title by J. Tavares, D. Hensley, and C. Murdoch.

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**2. Seashore paspalum rhizomes**

**3. Seashore paspalum (darker green) in a stand of hybrid bermudagrass (lighter green)**

regularly has a waxy (shiny) appearance compared to bermudagrass (Photo 3). This is especially pronounced on the underside (abaxial surface) of each leaf blade

Restrictions on the use of potable water for turfgrass maintenance are increasing. Consequently, the popularity and use of seashore paspalum has increased statewide. The improved salinity tolerance of seashore paspalum compared to other warm season turfgrasses allows it to be irrigated with non-potable water sources. Most warm-season turfgrasses do not provide acceptable turf quality when irrigated with non-potable water. As the restrictions on potable water use increase, seashore paspalum use also will increase. Note that in situations where non-potable sources of irrigation are used, soil chemical properties need to be monitored regularly.

Research-based information on the performance and quality of seashore paspalum and its cultivars is limited. In 2007, the National Turfgrass Evaluation Program (NTEP) initiated the first nationwide trial of seashore paspalum cultivars. Consult www.ntep.org for more about this program.

Often, what is accepted as "common knowledge" about this turfgrass is anecdotal and potentially inaccurate. Much of the information in this publication is adapted from the references listed at its end. Readers wishing to receive a version of this document that includes in-text citations linking its statements to the references they were derived from should contact the author (brosnan@hawaii.edu).

## Cultivars

**'Aloha'** is a proprietary cultivar released by Environmental Turf Inc. (Avon Park, FL). 'Aloha' is a medium-textured, dark green cultivar with high shoot density. Its leaf texture is slight coarser (wider) than 'Seadwarf'. Developed by the University of Florida, this cultivar is suited for use on golf courses, athletic fields, and landscaped sites. Recent research found 'Aloha' to be one of the top-performing cultivars when maintained at fairway mowing heights (< ½ inch).

**'Salam'** is a proprietary cultivar grown by Southern Turf Nurseries (Alapaha, GA). 'Salam' is a fine-textured, dark green variety with high shoot density. Released in the early 1990s, it is suited for use on golf courses, athletic fields, and landscaped sites. The overall quality of 'Salam' is similar to 'Sea Isle 1'. Increased susceptibility to dollar spot (*Sclerotinia homoeocarpa*) (Photo 12) on 'Salam' has been reported. 'Salam' is currently the most common seashore paspalum cultivar in Hawai'i. The "wild type" or "legacy" seashore paspalum present in Hawai'i since the mid-1970s is often mistakenly referred to as 'Salam'.

**'Seadwarf'** is a proprietary cultivar released by Environmental Turf Inc, (Avon Park, FL). It is a fine-


**4. Vertical mower** (photo, J.A. Borger)

textured, bright green cultivar with high shoot density used on golf course tees, fairways, roughs, and greens, as well as on athletic fields and other landscaped areas. Research has found 'Seadwarf' to be one of the top-performing seashore paspalum cultivars when maintained at greens height (< 5/32 inch). It has been reported to be less susceptible to dollar spot than other seashore paspalum cultivars.

**'Sea Isle 1'** was released by the University of Georgia breeding program in 1999. It is a fine-textured, dark green cultivar with high shoot density used on athletic fields, golf course fairways, and other landscaped areas. Increased susceptibility to dollar spot has been reported and observed in Hawai'i. Research has found 'Sea Isle 1' to have drought tolerance equal to that of 'Tifway' bermudagrass and 'TifBlair' centipedegrass.

**'Sea Isle 2000'** is a proprietary cultivar grown by Southern Turf Nurseries (Alapaha, GA). It is a fine-textured, dark green cultivar with high shoot density used on golf course greens and tees, athletic fields, and other landscaped sites. Research has found 'Sea Isle 2000' to be one of the top-performing seashore paspalum cultivars when maintained as a golf course putting green (< 5/32 inch mowing height). Its reduced susceptibility to dollar spot has been reported by multiple researchers.

**'Seaspray'** is the only seashore paspalum cultivar available (as of February 2008) that can be established from seed. 'Seaspray' is a proprietary cultivar distributed by Scotts Turf-Seed Inc. (Gervais, OR). This medium-textured, bright green cultivar with high shoot density can be used on golf course greens, tees, fairways, and roughs, as well as athletic fields and other landscape areas. Recent research found 'Seaspray' to be less susceptible to dollar spot than other seashore paspalum cultivars maintained as golf course fairways (< ½ inch mowing height). Slow establishment rates have been observed.

Other cultivars not described above include **'Neptune'**, **'Sea Isle Supreme'**, **'Seaway'**, and **'Seagreen'**.

### Soil types

Seashore paspalum does not prefer a specific soil type. It produces a high quality turf in soil types varying in texture, moisture content, aeration, pH, and salinity. It will produce a higher quality turf than other warm-season turfgrasses in poor quality soils. Seashore paspalum should be selected over bermudagrass for coastal areas of Hawai'i affected by salt spray.

## Establishment

### Vegetative propagation

Seashore paspalum cultivars are usually established by sprigging or stolonizing. Sprigging utilizes both the underground rhizomes and aboveground stolons as vegetative sources of plant material, while stolonizing uses only aboveground vegetative propagules.

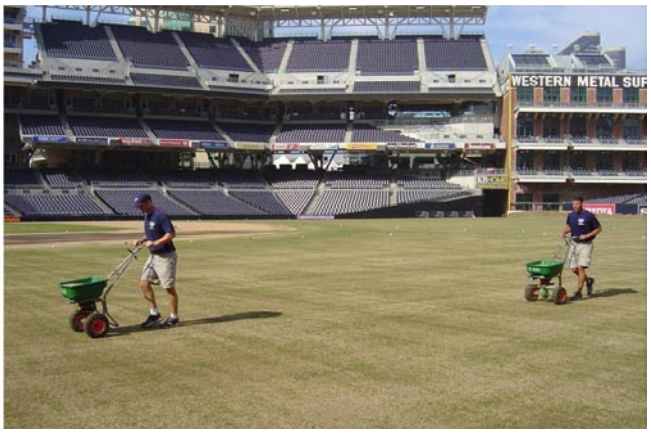
Sprigs are obtained by shredding harvested sod or with a sprig harvester. Stolons are generally harvested with a vertical mower (Photo 4). Sprigs should be 6–8 inches long and have at least two vegetative nodes.

Establishment with freshly harvested sprigs or stolons will enhance survival. Ideally, sprigs and stolons should be planted within 48 hours of being harvested. Before planting, it is important to promote airflow through the harvested material to prevent heat buildup. It is recommended that stockpiles be regularly turned (rotated) to promote airflow and that they be stored in shady, moist conditions.

Sprigs or stolons should be planted at a rate of 200–800 bushels per acre, depending on the rate of cover required. A bushel is defined as the amount of material harvested from 1 sq yd of sod. At the lower end of this range, it will take at least 3 months to achieve complete turfgrass cover. Increasing the sprig/stolon planting rate will reduce the time required for the area to become established. Plant material should be evenly broadcast over the area and pressed ("cut") into moist soil with a roller. After rolling, apply a light (< ¼ inch) layer of topdressing to the area (soil, mulch, or hydromulch) (Photo 5).

Water immediately after topdressing. Sprigs and

**5. Application of hydromulch after stolonizing**



**6. Applying seed with a rotary spreader**
Photo by L. Yoder, San Diego Padres

stolons are subject to drying out, as they are planted at shallow depth. Light, frequent irrigation (four to six times daily) is recommended until roots become established. This process takes between 2 and 4 weeks depending on environmental conditions. Complete turfgrass cover is normally reached within 2–4 months, depending on environmental conditions. Finer-textured ecotypes reach establishment faster than coarser ecotypes because of a greater node-to-volume ratio.

## Seeded establishment

As of February 2008, only one commercially available cultivar of seashore paspalum, 'Seaspray', can be established by seed. Recommended seeding rates range between ¾ and 1¼ pounds of raw seed per 1000 sq ft. For coated seed, increase rates to 1–2 pounds per 1000 sq ft. Do not sow seed when soil temperatures are below 60°F.

Seed is often applied with a rotary spreader (Photo 6). To promote uniform coverage, divide the seed into two equal portions and apply it in two directions across the area.

After seeding, lightly roll the area to promote seed-to-soil contact, and apply a light (< ¼ inch) layer of top-dressing (e.g., soil, mulch, compost, or hydromulch).

During seeded establishment, light, frequent irrigation (four to six times daily) is recommended for at least 2–3 weeks.

Germination occurs within 10–17 days; note that slow establishment rates have been observed throughout Hawai'i.

## Fertilizer applications during establishment

Fertilizer will need to be applied during establishment. Note that the response of seashore paspalum to ammonium-N fertilizers can be minimal. It is recommended that nitrate-N fertilizers be used during establishment. Fertilizer should be applied at a rate of 1 lb N per 1000 sq ft every 2–3 weeks until the site reaches 90 percent turfgrass cover. It is important to use only soluble nitrogen sources such as calcium nitrate, $Ca(NO_3)$, during establishment. Light verticutting, beginning 5–6 weeks after planting and continuing every 7–14 days until 100 percent turfgrass cover is obtained, has been reported to increase establishment rates. Note that once 90 percent turfgrass cover has been obtained, fertilizer inputs should be significantly reduced. This will be discussed in a later section.

During vegetative and seeded establishment there may be a need to control both broadleaf and grassy weeds, as well as sedges. Seashore paspalum is very sensitive to many herbicides. Consult the CTAHR publication *Chemical Weed Control Recommendations for Turfgrasses in Hawaii* for more information

## Mowing

Seashore paspalum should be mowed below 1 inch. Reductions in mowing height will increase turf density and produce plants with shorter internodes. Golf course putting greens are maintained between ⅛ and ⅕ inch, while tees range between ½ and 13⁄16 inch, and fairways range between ½ and ¾ inch. Athletic fields and other landscape areas should be maintained between ½ and 1


**7. A reel mower**

inch. A reel mower is recommended (Photo 7). Note that thatch problems increase with higher mowing heights. It is essential that no more than one-third of the leaf blade be removed during a single mowing. If the turf takes on a "scalped" appearance, too much leaf tissue is being removed. This can be exacerbated in situations where a significant thatch layer is present ( > ½ inch). Always mow with sharp blades to avoid tearing leaf tissues.

## Nutrient management

Once established, seashore paspalum needs little fertilization. Optimum annual nitrogen fertilizer rates range between 5 and 8 lb per 1000 sq ft for golf course fairways, tees, athletic fields, and other landscape areas. Golf course putting greens should receive 3–6 lb N per 1000 sq ft annually. Yearly application rates in areas of the United States with shorter growing seasons than Hawai'i will be less than the amounts listed herein, as this species uses 40–50 percent less nitrogen than hybrid bermudagrasses. Note that excessive fertilizer application will lead to development of a significant thatch layer.

Seashore paspalum only responds to nitrate-nitrogen. This characteristic is a function of the species evolution in coastal, brackish ecosystems. Seashore paspalum can make use of ammonium-nitrogen after it has been converted to nitrate during the process of nitrification. However, if environmental conditions do not favor the nitrification process (soil temperatures <55°F, pH <5.5, waterlogged or poorly aerated soils), fertilizers supplying nitrogen as ammonium should be avoided.

Soil tests should be conducted annually to determine other nutrient needs. Phosphorus fertilizer should be applied based solely on soil test recommendations. If deficiencies are not detected, phosphorus fertilization is not needed.

Potassium fertilization affects seashore paspalum quality. Seashore paspalum is often grown in soils high in sodium that receive applications of calcium and magnesium to ameliorate soil chemical properties. In these instances, potassium can be thoroughly leached out of the rootzone. Potassium can also be deficient in soils that receive extra irrigation to leach salts through the rootzone. It is recommended that 3–8 percent of the soil CEC sites contain potassium. Fertilizers delivering a 1–1.5 : 1 ratio of nitrogen to potassium are recommended.

In situations where seashore paspalum is maintained in saline or sodic soils, regular applications of calcium may be required.

## Irrigation

### *Potable water*

Like other warm-season turfgrasses, seashore paspalum produces a high-quality turf when irrigated with potable water. Actively growing seashore paspalum cultivars require 1–1½ inches of water per week, depending on environmental and soil conditions. Note that seashore paspalum can also persist in waterlogged soils for extended periods of time. Irrigate early in the morning to minimize wind distortion. Deep, infrequent irrigation (no more than twice a week) is recommended for mature seashore paspalum stands to promote root development. Try to moisten the soil to a 6-inch depth with each irrigation event. Watering during the early morning hours will also limit the amount of time leaf tissue remains moist, reducing the likelihood of disease development.

### *Ocean water*

Seashore paspalum cultivars can be irrigated with ocean water; however, turfgrass quality will be lower than if the same cultivar was irrigated with potable water. It is important to irrigate with high volumes of water and regularly apply sulfur plus lime or gypsum in order to keep salts from building up in the soil profile. Note that irrigating with large volumes of ocean water can cause nutrient imbalances throughout the rootzone. Also, nitrogen fertility should be reduced, as the plant will utilize dissolved nitrates in the irrigation water. Irrigating with ocean water is not recommended and should be done

**8. Damage from saline irrigation water drift.**

**9. Core pulled from an athletic field to examine thatch buildup**

on a site-specific basis. If ocean water is chosen as the source of irrigation water, multiple cultural practices will be required in order to manage the turfgrass rootzone appropriately.

### *Recycled water*

If irrigating with recycled water, quality tests must be conducted regularly. Frequency of testing will depend on the uniformity of the water source. Quality tests should monitor the levels of carbonate/bicarbonate, pH, and heavy metals in the irrigation water. Care must be taken if ornamental plant materials adjacent to or within a seashore paspalum turfgrass stand are irrigated with (or subjected to drift from) the same recycled water used to irrigate the turf. If exposed to this water, these ornamental plants may become damaged (Photo 8), as the salinity tolerance of many of these species is much lower than that of seashore paspalum. When using recycled irrigation water, scheduling and subsequent management should be done on a site-specific basis. The use of recycled water during establishment is not recommended.

## Thatch management

Thatch is a layer of partially decomposed organic matter intermingled with live plant stems at the soil surface. Periodic removal of thatch with a "vertical mower" (Photo 4) is necessary to properly maintain a healthy seashore paspalum turfgrass stand. Golf course putting greens and fairways should be vertically mowed two to four times annually. Sites receiving more foot traffic (athletic fields, golf courses tees, landscaped areas) may require more frequent vertical mowing. Increased stolon growth following vertical mowing has been reported. Examine thatch buildup by pulling cores (Photo 9). Action is required if the layer of thatch is between ½ and ¾ inch thick. Vertical mower blades penetrate into the surface, removing thatch buildup at the soil-turfgrass interface. Blades should be spaced approximately 1 inch apart for seashore paspalum. Mow in two directions at right angles. Debris (thatch) brought to the surface after vertical mowing can be raked, vacuumed, or blown off, but its removal is essential. This can be done by hand or with one of the many commercially available units (Photo 10).

Similar to what is recommended for hybrid bermudagrass, light, frequent topdressing applications (< ¼ inch) of sand will help prevent development of excessive thatch. On sand-based sites, is important to select a topdressing sand that is similar in particle size to that found in the root zone. Topdressing programs are designed to supplement vertical mowing, not replace them. Topdressing alone will not effectively control thatch buildup in seashore paspalum. Vertical mowing is essential.

## Pest Problems

### *Weeds*

Weed infestation is the most persistent turfgrass pest problem in Hawai'i. To control weed problems effectively, the weed species needs to be accurately identified, and a

**10. Commercially available vacuum unit to collect debris after vertical mowing** Photo by L. Yoder, San Diego Padres

**11. Fairy ring on a 'Salam' seashore paspalum putting green**

herbicide providing control of that species needs to be selected. Problematically, many herbicides are not labeled for use on seashore paspalum, as they can induce significant injury after application. *Do not use a herbicide that is not labeled for use on seashore paspalum*. Furthermore, many products available for use on golf courses may not be labeled for use on home lawns or athletic fields. Always read the product label before selecting a herbicide. Most three-way mixtures of 2,4-D, MCPP, and dicamba are labeled for use on seashore paspalum and provide postemergence control of many broadleaf weeds. Halosulfuron (SedgeHammer®, formerly marketed as Manage®) and sulfosulfuron (Certainty®) are labeled for controlling purple nutsedge ("nutgrass") and kyllingas in seashore paspalum. Consult your local UH-CTAHR Cooperative Extension Service office for help with weed identification and herbicide selection.

Research is currently being conducted to evaluate the use of salt as an alternative weed control method in seashore paspalum. The salinity tolerance of many weed species is significantly less than that of seashore paspalum; thus, applications of salt may fatally injure certain weed species without harming the desired seashore paspalum turf. However, repetitive applications of certain salts may result in severe, long-term damage to soil quality. Currently, applications of various salt products are being evaluated for both weed control efficacy and long-term effects on soil quality. Until research conclusions can be made, the use of salt to control weeds in seashore paspalum turfgrass is not recommended.

**12. Dollar spot in seashore paspalum**

### *Diseases*

Seashore paspalum can be affected by various turfgrass pathogens. Multiple researchers have reported differences in cultivar susceptibility to dollar spot (*Sclerotinia homoeocarpa*), with 'Sea Isle 1' being one of the more susceptible cultivars. Susceptibility to leaf spot diseases (*Helminthosporium* spp., *Bipolaris* spp., *Drechslera* spp.) and fairy ring has been observed in Hawai'i as well (Photo 11). Researchers in Florida have reported incidences of fusarium blight (*Fusarium* sp.) and take-all patch (*Gaeumannomyces graminis*) on seashore paspalum.

Many fungicides providing control of these diseases are labeled for use on seashore paspalum. Note that many products available for use on golf courses may not be labeled for use on home lawns or athletic fields. Always read the product label before selecting a fungicide. Consult your local CTAHR Cooperative Extension Service office for help with disease identification and fungicide selection.

Cultural practices are the best defense against pathogen invasion. Some steps to reduce the likelihood of disease incidence include the following:

- Avoid excessive nitrogen fertilization.
- Avoid late-afternoon or evening irrigation.
- Mow appropriately: do not scalp the turf and always keep mower blades sharp.
- Maintain adequate aeration and drainage throughout the rootzone.
- Manage thatch accumulation.

### *Insects*

Insect damage on seashore paspalum has been reported. Damage from mole crickets, sod webworms, spittlebugs, white grubs, billbugs, cutworms, and fall armyworms has been observed on golf courses and home lawns.

Many insecticides providing control of these diseases are labeled for use on seashore paspalum. Note that many products available for use on golf courses may not be labeled for use on home lawns or athletic fields. Always read the product label before selecting an insecticide. Consult your local CTAHR Cooperative Extension Service office for help with disease identification and insecticide selection.

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Photo 4 is by J.A. Borger, Photo 10 by L. Yoder, all other photos by J. Brosnan.

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