**Family:** Poaceae  
**Taxon:** Muhlenbergia capillaris  
**Common Name:** hairawn muhly  
**Synonym:** purple muhly grass  
**Pink muhly**  

<table>
<thead>
<tr>
<th>Questionnaire :</th>
<th>Status:</th>
<th>Assessor:</th>
<th>Data Entry Person:</th>
<th>Designation:</th>
<th>WRA Score:</th>
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<tr>
<td>101 Is the species highly domesticated?</td>
<td>current 20090513</td>
<td>Chuck Chimera</td>
<td>Chuck Chimera</td>
<td>EVALUATE</td>
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<td>102 Has the species become naturalized where grown?</td>
<td>Assessor Approved</td>
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<td>103 Does the species have weedy races?</td>
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<tr>
<td>201 Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute &quot;wet tropical&quot; for &quot;tropical or subtropical&quot;</td>
<td>High (0-low; 1-intermediate; 2-high) (See Appendix 2)</td>
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<td>202 Quality of climate match data</td>
<td>High (0-low; 1-intermediate; 2-high) (See Appendix 2)</td>
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<td>203 Broad climate suitability (environmental versatility)</td>
<td>y=1, n=0</td>
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<tr>
<td>204 Native or naturalized in regions with tropical or subtropical climates</td>
<td>y=1, n=0</td>
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<td>205 Does the species have a history of repeated introductions outside its natural range?</td>
<td>y=2, n=0</td>
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<tr>
<td>301 Naturalized beyond native range</td>
<td>y = 1*multiplier (see Appendix 2), n= question 205</td>
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<td>302 Garden/amenity/disturbance weed</td>
<td>n=0, y = 1*multiplier (see Appendix 2)</td>
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<td>303 Agricultural/forestry/horticultural weed</td>
<td>n=0, y = 2*multiplier (see Appendix 2)</td>
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<td>304 Environmental weed</td>
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<td>305 Congeneric weed</td>
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<td>401 Produces spines, thorns or burrs</td>
<td>y=1, n=0</td>
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<td>402 Allelopathic</td>
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<td>403 Parasitic</td>
<td>y=1, n=0</td>
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<tr>
<td>404 Unpalatable to grazing animals</td>
<td>y=1, n=0</td>
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<td>405 Toxic to animals</td>
<td>y=1, n=0</td>
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<tr>
<td>406 Host for recognized pests and pathogens</td>
<td>y=1, n=0</td>
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Key Words: Evaluate, Ornamental Grass, Palatable, Fire-adapted, Clumping, Perennial
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<tr>
<th>ID</th>
<th>Question</th>
<th>Value</th>
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<tr>
<td>407</td>
<td>Causes allergies or is otherwise toxic to humans</td>
<td>y=1, n=0</td>
<td>n</td>
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<td>408</td>
<td>Creates a fire hazard in natural ecosystems</td>
<td>y=1, n=0</td>
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<tr>
<td>409</td>
<td>Is a shade tolerant plant at some stage of its life cycle</td>
<td>y=1, n=0</td>
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<tr>
<td>410</td>
<td>Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)</td>
<td>y=1, n=0</td>
<td>y</td>
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<tr>
<td>411</td>
<td>Climbing or smothering growth habit</td>
<td>y=1, n=0</td>
<td>n</td>
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<tr>
<td>412</td>
<td>Forms dense thickets</td>
<td>y=1, n=0</td>
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<tr>
<td>501</td>
<td>Aquatic</td>
<td>y=5, n=0</td>
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<tr>
<td>502</td>
<td>Grass</td>
<td>y=1, n=0</td>
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<td>503</td>
<td>Nitrogen fixing woody plant</td>
<td>y=1, n=0</td>
<td>n</td>
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<tr>
<td>504</td>
<td>Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)</td>
<td>y=1, n=0</td>
<td>n</td>
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<tr>
<td>601</td>
<td>Evidence of substantial reproductive failure in native habitat</td>
<td>y=1, n=0</td>
<td></td>
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<tr>
<td>602</td>
<td>Produces viable seed</td>
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<tr>
<td>603</td>
<td>Hybridizes naturally</td>
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<td>604</td>
<td>Self-compatible or apomictic</td>
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<td>605</td>
<td>Requires specialist pollinators</td>
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<td>606</td>
<td>Reproduction by vegetative fragmentation</td>
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<tr>
<td>607</td>
<td>Minimum generative time (years)</td>
<td>1 year = 1, 2 or 3 years = 0, 4+ years = -1</td>
<td>2</td>
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<td>701</td>
<td>Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)</td>
<td>y=1, n=-1</td>
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<tr>
<td>702</td>
<td>Propagules dispersed intentionally by people</td>
<td>y=1, n=-1</td>
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<tr>
<td>703</td>
<td>Propagules likely to disperse as a produce contaminant</td>
<td>y=1, n=-1</td>
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<tr>
<td>704</td>
<td>Propagules adapted to wind dispersal</td>
<td>y=1, n=-1</td>
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<tr>
<td>705</td>
<td>Propagules water dispersed</td>
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<td>706</td>
<td>Propagules bird dispersed</td>
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<td>707</td>
<td>Propagules dispersed by other animals (externally)</td>
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<tr>
<td>708</td>
<td>Propagules survive passage through the gut</td>
<td>y=1, n=-1</td>
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<tr>
<td>801</td>
<td>Prolific seed production (&gt;1000/m2)</td>
<td>y=1, n=-1</td>
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<td>802</td>
<td>Evidence that a persistent propagule bank is formed (&gt;1 yr)</td>
<td>y=1, n=-1</td>
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<td>803</td>
<td>Well controlled by herbicides</td>
<td>y=-1, n=1</td>
<td>y</td>
</tr>
<tr>
<td>804</td>
<td>Tolerates, or benefits from, mutilation, cultivation, or fire</td>
<td>y=1, n=-1</td>
<td>y</td>
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<tr>
<td>805</td>
<td>Effective natural enemies present locally (e.g. introduced biocontrol agents)</td>
<td>y=-1, n=1</td>
<td></td>
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</table>

**Designation:** EVALUATE  **WRA Score:** 5
Supporting Data:


[Is the species highly domesticated? No evidence] "Though the species name has been in regular use since 1824, there has been taxonomic confusion throughout the 20th century about what is included in the species. While as recently as 1989 the species included three varieties, the most current treatment of the genus has Muhlenbergia capillaris without any varieties, and two closely-related species taking the place of former varieties."


[Is the species highly domesticated? No] "There are no recommended cultivars or selected materials at this time. Hairawn muhly is available from commercial nurseries specializing in native plants."


NA


NA


[Species suited to tropical or subtropical climate(s) 2-High] "A warm season perennial bunchgrass; plants 1 to 3 feet tall; seed stalks 2 to 5 feet tall, a very showy pink to purple color; adapted to the backside of dunes, cabbagel palm hammocks, saline flats, marl prairies and marshy areas throughout Florida; some types also grow in sandhills."


[Species suited to tropical or subtropical climate(s) 2-High] "Southeastern U.S., Mexico, Guatemala."


[Quality of climate match data? 2-High]


[Broad climate suitability (environmental versatility)? Presumably Yes. Broad native range and latitudinal distribution] "Rock or sandy woods, Massachusetts to Indiana and Kansas, south to Florida and Texas; West Indies, eastern Mexico."


[Broad climate suitability (environmental versatility)? Yes] "Hardiness: USDA Zones 6 - 10."


[Native or naturalized in regions with tropical or subtropical climates? Yes] "Rock or sandy woods, Massachusetts to Indiana and Kansas, south to Florida and Texas; West Indies, eastern Mexico."


[Native or naturalized in regions with tropical or subtropical climates? Yes] "In the southeastern United States, Muhlenbergia capillaris usually grows in rocky or clay soils in open woodlands and savannahs and on calcareous outcrops, at elevations of 0-500 m. In the northeastern states, it is also found on diabase and sandstone outcrops and ridges. Its native range includes the southeastern United States, Bahamas, and possibly various Caribbean islands. It is also grown as an ornamental."


[Native or naturalized in regions with tropical or subtropical climates? Yes] "Outside the United States, Muhlenbergia capillaris occurs in the Bahamas and possibly other Caribbean islands (Peterson 2003). Kartesz and Meacham (2001) list the species as rare in Puerto Rico. The Missouri Botanical Garden Specimen Database (2004) includes records of Muhlenbergia capillaris specimens from the mountains of southern Mexico and adjacent Guatemala, as well as from the Yucatan peninsula."


[Does the species have a history of repeated introductions outside its natural range? Questionable] Used as an ornamental within its native range, but information about is introduction elsewhere was not found.


[Naturalized beyond native range? No evidence]


[Naturalized beyond native range? No evidence]
**Muhlenbergia capillaris** (Poaceae)


  **[Garden/amenity/disturbance weed? No evidence]**


  **[Agricultural/forestry/horticultural weed? No evidence]**


  **[Environmental weed? No evidence]**


  **[Congeneric weed? Yes] "Muhlenbergia frondosa (Poiret) Fernald (wirestem muhly) is a warm-season perennial grass native to North America, known to infest the Midwest and Northeast areas of the United States, as well as Southwestern Ontario, Canada. M. frondosa invasions were thought to be agriculturally insignificant until the 1950s. Infestations in new areas have increased since the 1980s (Salzman et al., 1997). Reproduction is by both seed and rhizomes. Each plant is capable of producing as many as 140,000 seeds (Doll et al., 1986). Spread of M. frondosa can result from cultivation pulling the rhizomes apart and dispersing them from the original plant."


  **[Produces spines, thorns or burrs? No] "Perennial in tufts; culms rather slender, erect, 60 to 100 cm. tall; sheaths scaberulous, at least toward the summit, and with auricles mostly 3 to 5 mm. long; blades elongate, flat or involute, 1 to 4 mm. wide, those of the innovations narrower, involute; panicles purple, oblong, diffuse, one-third to half the entire height of the culm, the branches capillary, flexuous, the branchlets and pedicels finally spreading..."

- **2012.** WRA Specialist. Personal Communication.

  **[Allelopathic? Unknown]**


  **[Parasitic? No evidence]**


  **[Unpalatable to grazing animals? No] "From observation, the species most readily eaten by cattle were salt grass, knotroot bristle grass (Setaria geniculata), panic grass (Panicum boscii), needle-head panic grass (P. acicularia), bahia- grass (Paspalum notatum), paspalum (Paspalum spp.), gulf hairawn muhly (Muhlenbergia capillaris), and climbing hempweed (Mikania scandens). None of these plants were absent from, or less abundant on, grazed compared to un-grazed areas."

- **2006.** Harrison, M., Groundcovers for the South. Pineapple Press Inc., Sarasota, FL

  **[Unpalatable to grazing animals? No] "Muhly grass provides food, shelter, cover, and nest-building material for birds. It also provides food for grazing animals, nectar for pollinating insects, and seeds for ground-level foragers."

- **2006.** Harrison, M., Groundcovers for the South. Pineapple Press Inc., Sarasota, FL

  **[Toxic to animals? No evidence] "Muhly grass provides food, shelter, cover, and nest-building material for birds. It also provides food for grazing animals, nectar for pollinating insects, and seeds for ground-level foragers."


  **[Host for recognized pests and pathogens? No] "There are no known pests or problems."

- **2002.** Pfaff, S./Gonter, M.A./Maura, C., Florida Native Seed Production Manual. USDA Natural Resources Conservation Service Plant Materials Center, Brooksville, FL

  **[Host for recognized pests and pathogens? Aphids are widespread, generalist pests] "Blooms can become heavily infested with aphids during the early stages of seed development, especially in the milk stage. The amount of damage they cause is unknown and insecticides have yet to be tested. Large numbers of beneficial insects, such as ladybug beetles, have also been observed. Increasing their numbers may be a natural means of biological control."


  **[Host for recognized pests and pathogens? No] "Pests: Generally pest-free. Diseases: Generally disease-free."


  **[Causes allergies or is otherwise toxic to humans? No evidence]**


  **[Causes allergies or is otherwise toxic to humans? No evidence]**
Muhlenbergia capillaris (Poaceae)


[Creates a fire hazard in natural ecosystems? Potentially Yes] "Based on the preceding biological and habitat information, Muhlenbergia capillaris can be characterized as an upland, woodland or prairie/savannah species. Furthermore, as a grass, its growth pattern is such that it annually produces dead leaves and fruiting stems that translate into fine fuels. Fine fuels can quickly dry out and burn. Both its dry habitat in conjunction with its production of fine fuels, make it a species likely adapted for fire. Three studies involving prescribed burns suggest it is a fire adapted species."


[Creates a fire hazard in natural ecosystems? Potentially Yes] "Repeated fires may have potential for controlling melaleuca; however, fuel loads may be insufficient to carry fire in consecutive years. Some wet grasslands might be capable of providing sufficient fuel for a second fire within 2 or 3 years after the first fire. Nearly all melaleuca seedlings were killed in a second fire 2 years after a wildfire in a wet grassland dominated by muhly grass (Muhlenbergia capillaris) (Belles and others 1999)."


[Is a shade tolerant plant at some stage of its life cycle? Probably No] "Shading by woody plants is another potential threat to these sun-loving plants."


[Is a shade tolerant plant at some stage of its life cycle? Possibly] "This grass is drought tolerant but cannot take waterlogging."


[Is a shade tolerant plant at some stage of its life cycle? Possibly] "Light: Full sun to light shade."


[Tolerates a wide range of soil conditions? Yes] "Hairawn muhly prefers neutral to slightly acidic soils but can tolerate many soil types. It has a low tolerance for high pH soils and a high tolerance for salinity."


[Tolerates a wide range of soil conditions? Yes] "Gulf muhlygrass tolerates a wide variety of soil conditions from moist to dry, acidic to alkaline, and sandy to marly. Established plantings will not need supplemental watering, but the grass will get larger with liberal irrigation."


[Climbing or smothering growth habit? No] "Perennial in tufts; culms rather slender, erect, 60 to 100 cm. tall; sheaths scaberulous, at least toward the summit, and with auricles mostly 3 to 5 mm. long; blades elongate, flat or involute, 1 to 4 mm. wide, those of the innovations narrower, involute; panicles purple, oblong, diffuse, one-third to half the entire height of the culm, the branches capillary, flexuous, the branchlets and pedicels finally spreading…"


[Aquatic? No] "Rock or sandy woods, Massachusetts to Indiana and Kansas, south to Florida and Texas; West Indies, eastern Mexico."


[Grass? Yes]


[Nitrogen fixing woody plant? No] Poaceae


[Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)? No] "Perennial in tufts; culms rather slender, erect, 60 to 100 cm. tall; sheaths scaberulous, at least toward the summit, and with auricles mostly 3 to 5 mm. long; blades elongate, flat or involute, 1 to 4 mm. wide, those of the innovations narrower, involute; panicles purple, oblong, diffuse, one-third to half the entire height of the culm, the branches capillary, flexuous, the branchlets and pedicels finally spreading…"


[Evidence of substantial reproductive failure in native habitat? Possibly in parts of the native range] "Hairawn muhly is listed as an endangered species in Connecticut, Indiana, Maryland, and New Jersey; as extirpated in Pennsylvania; and as presumed extirpated in Ohio."

[Produces viable seed? Yes] "viable seed production varies widely between ecotypes"


[Produces viable seed? Yes] "Seeds should be collected from plants in late fall and air-dried for five to ten days. Collect seeds during the warmest and driest time of day using a comb to avoid disturbing the appearance of the plant."


[Produces viable seed? Yes] "Propagation: Gulf muhlygrass is easy to start from seed. Existing clumps can be divided to start new plants."


[Hybridizes naturally? Unknown] No evidence


[Self-compatible or apomictic? Unknown] "With such few plants persisting, inbreeding depression and genetic drift are other potential threats to the species' viability in the region. While no genetic studies have been done on Muhlenbergia capillaris, genetic studies and theory suggest that selection may work against self-pollinated individuals and homozygotes derived from selfing in small populations of outcrossing species (Neel et al. 2001)."


[Requires specialist pollinators? No] "The reduced flowers are anemophilous…"


[Requires specialist pollinators? No] "As with many cespitose grasses, Muhlenbergia capillaris reproduces primarily via seed. Pollination is assumed to be by wind."


[Reproduction by vegetative fragmentation? No] "Muhlenbergia capillaris is a perennial grass that forms dense clumps (Peterson 2003). Since it is neither rhizomatous nor stoloniferous, the species must reproduce via seed."


[Reproduction by vegetative fragmentation? No] "Hairawn muhly clumps but does not spread through above or underground stems (stolons or rhizomes)."


[Minimum generative time (years)? 2+] "It will take another 2-3 years to reach maturity and real be show-stoppers."


[Minimum generative time (years)? 2+] "2-5 years to maturity"


[Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)? Potentially] "Muhlygrass is recommended for road shoulders and medians."


[Propagules dispersed intentionally by people? Yes] "Uses Conservation: Hairawn muhly is a hardy and drought-tolerant native ornamental grass that can be used for land reclamation. It is also useful as a fine fuel for understory burn management programs. Landscaping and wildlife: Hairawn muhly produces striking pink and purple blooms in the fall. It requires little maintenance and is excellent for meadow gardens and as a general garden plant. Hairawn muhly is known to attract beneficial insects such as ladybug beetles (Coccinella spp.). The clumping habit of hairawn muhly makes it excellent for use as wildlife cover."


[Propagules likely to disperse as a produce contaminant? Possibly if used in floral arrangements] "Muhly grass is frequently used as a reclamation plant in natural areas, and also in cut flowers, borders, roadside plantings, and meadows."
Muhlenbergia capillaris (Poaceae)


[Propagules adapted to wind dispersal? Unknown] "Panicels 15-50(60) cm long, 5-30(41) cm wide, longer than wide, diffuse; primary branches 2 20 cm, capillary, diverging 30-100° from the rachises, naked basally, lower branches with 5-20 spikelets; pedicels 10-40(50) mm, longer than the spikelets, capillary, flexible. Spikelets 3-5 mm, usually purple, occasionally green, brown, or stramineous. Glumes subequal, (0.3)1-1.5(2) mm, usually less than 1/2 as long as the lemmas, glabrous; lower glumes 1 veined, usually unawned, rarely awned, awns 1-3 mm; upper glumes1-veined, rarely 3 veined, acute to acuminate, often erosive, usually unawned, rarely awned, awns 1 3(5) mm; lemmas 3-5 mm, lanceolate, not shiny, calluses shortly pubescent, apices scabrous, acuminate, sometimes with 2 setaceous teeth, teeth to 1 mm, unawned or awned, awns 2 13(18) mm, clearly demarcated from the lemma bodies; paleas 2-4.5 mm, lanceolate, acuminate, usually unawned; anthers 1.5-2 mm, purple. Caryopse 2-2.5 mm, narrowly ellipsipt, brownish. [No specific information was found in the available literature.]"

[Propagules water dispersed? No evidence] "Rock or sandy woods, Massachusetts to Indiana and Kansas, south to Florida and Texas; West Indies, eastern Mexico." [Distribution suggests no]

[Propagules bird dispersed? No] "Although no direct references were found on the subject, seed dispersal for Muhlenbergia capillaris is likely via large mammals. The long awn on the lemma would appear to easily catch in the fur of a large mammal, especially those with longer hair, such as canids or sheep." [Possibly dispersed externally by adhering to feathers, but no evidence of interal dispersal by birds]

[Propagules dispersed by other animals (externally)? Presumably Yes] "Although no direct references were found on the subject, seed dispersal for Muhlenbergia capillaris is likely via large mammals. The long awn on the lemma would appear to easily catch in the fur of a large mammal, especially those with longer hair, such as canids or sheep."

[Propagules survive passage through the gut? Unknown] "If seeds are consumed when being grazed by animals, or if they retain viability after gut passage" [From observation, the species most readily eaten by cattle were salt grass, knotroot bristle grass (Setaria geniculata), panic grass (Panicum boscii), needle-head panic grass (P. accutaria), bahia- grass (Paspalum notatum), paspalum (Paspalum spp.), gulf hairawn muhly (Muhlenbergia capillaris),..."

[Prolific seed production (>1000/m2)? Unknown] "SPECIES DESCRIPTION: A warm season perennial bunchgrass; plants 1 to 3 feet tall; seed stalks 2 to 5 feet tall, a very showy pink to purple color; adapted to the backside of dunes, cabbage palm hammocks, saline flats, marl prairies and marshy areas throughout Florida; some types also grow in sandhills. Vegetatively, very similar to wiregrass, and useful for wildlife cover and fine fuels for understory burn management programs. AVERAGE SEED/LB (KG): 2,522,000/lb (5,560,000/kg) (bearded)."

[Well controlled by herbicides? Probably Yes] "However, it was concluded that isoxaflutole and mesotrione at appropriate rates and applied in sequence selectively control nimblewill without harming desirable turf." [Related species effectively controlled with herbicides]

[Tolerates, or benefits from, mutilation, cultivation, or fire? Yes] "By contrast, Muhlenbergia is apparently not adversely affected by drought, thrives under flooded conditions, and has been observed on several occasions to be the first species to recover following fires."
<table>
<thead>
<tr>
<th>Page</th>
<th>Reference</th>
<th>Natural Enemies Present Locally?</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>804</td>
<td>2004. Engstrom, B. Muhlenbergia capillaris (Lamark) Trinius Hairgrass Conservation and Research Plan for New England. New England Wild Flower Society, Framingham, MA</td>
<td>[Tolerates, or benefits from, mutilation, cultivation, or fire? Yes] &quot;Burning, especially in the early spring versus dormant season, has been shown to greatly increase flower stem production in a closely-related species. Fire also appears to facilitate population growth.&quot; … “As with many upland grasses, Muhlenbergia capillaris reacts favorably to fires, both in flower stalk production and in regeneration (Bittner and West 1994, Snyder 2003).&quot;</td>
<td></td>
</tr>
<tr>
<td>805</td>
<td>2012. WRA Specialist. Personal Communication.</td>
<td>[Effective natural enemies present locally (e.g. introduced biocontrol agents)? Unknown] No native Muhlenbergia present in Hawaiian Islands, and no reports of pests or pathogens from Muhlenbergia mexicana or M. microsperma, the two species currently naturalized in the Hawaiian Islands</td>
<td></td>
</tr>
</tbody>
</table>
Summary of Risk Traits

High Risk / Undesirable Traits
- Broad climate suitability and wide natural range
- Adaptable to tropical climates
- Related species have become invasive
- Tolerates many soil conditions (and potentially able to exploit many different habitat types)
- Tolerates fire and could increase fire risks
- Can form almost pure ground cover in native range (could exclude other species)
- Reproduces by seeds which may be dispersed externally on the fur of animals

Low Risk / Desirable Traits
- No records of naturalization or invasiveness reported
- Non-toxic
- Landscaping and ornamental value
- Genus Muhlenbergia susceptible to herbicides