Notes on the grasses of Hawai‘i: New Records, Corrections, and Name Changes

DERRAL R. HERBST (Hawaii Biological Survey, Bishop Museum, 1525 Bernice Street, Honolulu, Hawai‘i 96817, USA) & W.D. CLAYTON (Royal Botanic Gardens, Kew, Richmond, Surrey, TW9 3AB, UK)

Under the auspices of a National Science Foundation Curatorial Grant awarded to the Bishop Museum, W.D. Clayton was able to spend 8 weeks (February–March 1994) in the museum's Herbarium Pacificum, curating the grasses of Polynesia, Micronesia, and parts of Melanesia. The authors presently are compiling a checklist of the grasses of these geographical areas.

The most comprehensive recent treatment of the Hawaiian grasses is the chapter on the Poaceae by Peter O'Connor in the *Manual of flowering plants of Hawai‘i* (hereafter, the *Manual*) (Wagner *et al*., 1990), which provides a modern, accurate account of the state's native and naturalized grasses. New collections and curating efforts after the cut-off date for the *Manual* project (September 1987) have resulted in a substantial number of new distributional records and detection of additional naturalized species. Also, recent publications have resulted in new taxonomic or nomenclatural changes for species that occur in the Hawaiian Islands. A number of earlier publications have provided additional information, updating O'Connor's grass treatment (Hughes, 1995; Herbarium Pacificum Staff, 1997; Herbst & Wagner, 1996; Lorence & Flynn, 1997; Lorence *et al*., 1995; Wagner & Herbst, 1995; Wagner *et al*., 1997). This paper continues in the tradition of these publications by providing records for naturalized species documented for the first time in the Hawaiian Islands, for new range extensions for naturalized and native species within the archipelago, and calls attention to taxonomic and name changes in the literature affecting species in the Hawaiian flora. These records and changes can be considered a supplement to the O'Connor chapter in Wagner *et al*. (1990).

Keys are provided along with the reports of new additions to the flora so that this paper can be used in conjunction with the *Manual* to identify the newly introduced species; the keys are modified from D. Clayton's keys in the Pacific Grass Checklist mentioned earlier in this introduction. Some species treated in the keys are known in Hawai‘i only as cultivated plants, but are included here for completeness and in anticipation that some of the species may have become naturalized in Hawai‘i, and others may in the future. Grasses are not collected systematically by most Hawaiian botanists, resulting in gaps in our knowledge of the family in Hawai‘i. We use the same definition for "naturalized" as used in Wagner *et al*. (1990: 1645).

This paper reports 12 new island distributional records for naturalized species, 12 for native species, and calls attention to 29 newly naturalized grasses in the Hawaiian Islands. We also include notes on 16 species for which the scientific name has changed, and 14 species which were misidentified in previous publications. A few additional notes on Hawaiian grasses could not be completed in time to be included in this paper; these will be published at a later date. All identifications were made by W.D. Clayton.

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1. Contribution No. 1998-005 to the Hawaii Biological Survey.

Agrostis

KEY TO THE SPECIES OF *AGROSTIS* IN HAWAI'I

1.	Lemma pilose; rhachilla extension well-developed, plumose ..... **A. avenacea**
1.	Lemma glabrous; rhachilla not prolonged (2).
2(1).	Palea 1/2–2/3 length of lemma; lemma usually awnless (3).
2.	Palea less than 1/4 length of lemma; lemma awned or awnless (4).
3(2).	Ligules of vegetative shoots as long as or longer than wide; panicle contracted after flowering; stoloniferous ..... **A. stolonifera**
3.	Ligules of vegetative shoots shorter than wide; panicle loose; rhizomatous .... **A. capillaris**
4(2).	Panicle branches, at least the lower, naked towards the base; panicle open or contracted, lanceolate to ovate; culms ascending or decumbent; stoloniferous; awn, when present, rising near base of lemma ..... **A. canina**
4.	Panicle branches bearing spikelets to the base; panicle contracted to spiciform; culms erect; tufted, without stolons; awn, when present, arising 1/2 way up lemma (5).
5(4).	Leaf-blades flat, 2–8 mm wide; panicle contracted, linear to lanceolate ..... **A. exarata**
5.	Leaf-blades involute, 1–2 mm wide; panicle spiciform, linear ..... **A. sandwicensis**

Agrostis capillaris L. **New state record**

A sixth species of *Agrostis* has been documented for the state of Hawai'i; the above key can assist in differentiating it from the other Hawaiian members of the genus. Two other collections of this species are at BISH, both from trial grass plots at the Hawaii Agricultural Experimental Station on Maui. The St. John/Mitchell collection cited below may have been an escape from 1 of these plots, but it is not known if the species is still extant on the island. *Agrostis capillaris* is native to Europe and temperate Asia, and has been widely introduced into other parts of the world.

Material examined: **MAUI**: East Maui, Haleakalā, Kaupō Gap, first cone south of Waikelaehia, in meadows, 6200 ft, 27 Aug 1945, *St. John and Mitchell 21,209* (BISH); Makawao, Haleakalā Substation, Hawaii Agricultural Experimental Station, 2100 ft, planted in grass garden, 9 Apr 1939, *Hosaka 2457* (BISH); Olinda, Hawaii Agricultural Experimental Station, 3500 ft, plot 20, 26 Jun 1940, *Murphy s.n.* (BISH 448124).

Agrostis sandwicensis Hillebr. **New island record**

Documented as occurring on Maui and Hawai'i (O'Connor, 1990: 1494), and reported from O'ahu (Hillebrand, 1888: 515), *A. sandwicensis* is now known from Kaua'i. The species is endemic to Hawai'i.

Material examined. **KAUA'I**: Kaua'i, Oct 1916, *Rock s.n.* (BISH 117779).

Agrostis semiverticillata (Forssk.) C. Chr. **Taxonomic change**

The taxon treated by O'Connor (1990: 1494) as *A. semiverticillata* is here considered a synonym of *Polypogon viridis* (Gouan) Breistr., a species native from S Europe to NW India.

Andropogon

Andropogon glomeratus (Walter) Britton, Sterns & Poggenb. **New state record**

Schizachyrium condensatum (Kunth) Nees has consistently been misidentified in the Hawaiian Islands as *A. glomeratus*. The true *A. glomeratus* has now been documented from the islands, based upon 5 collections from the island of Kaua'i. The species is native from southern USA to Mexico.

Material examined. **KAUA'I**: Hanalei District, Limahuli Valley, west side of ridge separating Limahuli and Hanakāpī'ai Valleys, 1600–2060 ft, 12 Oct 1987, *Flynn et al. 2179* (BISH); Wainiha Valley Road, 30.5 m, 18 Sep 1987, *Ishii s.n.* (BISH 635082); Hanalei National Wildlife Refuge, 0.5 m, 20 Nov 1989 *Wagner & Hanford 6278* (BISH); border of Hanalei and Kawaihau Districts, summit camp area of the powerline trail, 2150 ft, 3 Oct 1989, *Flynn et al. 3547* (BISH); Waimea District, Waimea Canyon State Park, Hwy 550 near hunter check-in station, 2500 ft, 27 Jan 1988, *Flynn et al. 2717* (BISH).

Anthephora

Anthephora hermaphrodita (L.) O. Ktze. **New state record**

Anthephora hermaphrodita is known from a single collection from O'ahu; it is native to tropical Central and South America.

Material examined. **O'AHU**: Makapu'u Coast Guard lighthouse, beside the road, 1 Jan 1981, *Whistler s.n.* (BISH 619115).

Aristida

Aristida adscensionis L. **Correction**

O'Connor (1990: 1482) cites *Munro 128*, collected on O'ahu in 1903, as the earliest documentation of this species in Hawai'i. The collection is the earliest, but actually was made at the American Sugar Company on Moloka'i. There is a single collection of *Aristida* from O'ahu in BISH, an unidentified species collected at Waialua, Poamoho, as a volunteer in a grass plot, on 29 Oct 1938, *Hosaka 2418*.

Bothriochloa

KEY TO SPECIES OF *BOTHRIOCHLOA* IN HAWAI'I

1. Pedicelled spikelets linear, much narrower than the sessile spikelets (2).
1. Pedicelled spikelets elliptic, about as wide as the sessile spikelets (3).
2(1). Culm nodes pubescent; sessile spikelets 4.5–7.3 mm long ..... **B. barbinodis**
2. Culm nodes glabrous; sessile spikelets 2.8–3.5 mm long ..... **B. laguroides**
3(1). Racemes borne on a central axis longer than themselves ..... **B. bladhii**
3. Racemes subdigitate or with a central axis shorter than the lowest raceme .... **B. pertusa**

Bothriochloa laguroides (DC.) Herter **New state record**

Bothriochloa laguroides is known from a single collection from the island of Maui. It is native to tropical America.

Material examined. **MAUI**: East Maui, Makawao, Hawaii Agricultural Experimental Station, in pasture, 2100 ft, 17 Jul 1941, *Hosaka 2605* (BISH).

Brachiaria

KEY TO THE SPECIES OF *BRACHIARIA* IN HAWAI'I

1. Margins of raceme rhachis tuberculate-ciliate; spikelets 4–6 mm long; glumes not separated by an internode ..... **B. brizantha**
1. Margins of raceme rhachis eciliate, sometimes the surface pilose (2).
2(1). Raceme rhachis triquetrous, without wings; spikelets 1.5–2.7 mm long ..... **B. reptans**
2. Raceme rhachis flat, ribbon-like, winged, 0.5–1.5 mm wide (3).
3(2). Spikelets paired in several untidy rows, 2.5–3.5 mm long; glumes not separated by an internode; perennial ..... **B. mutica**
3. Spikelets borne singly in 1–2 rows; glumes separated by a short internode; annual (4).
4(3). Length of spikelets 4–5.5 mm ..... **B. plantaginea**

4. Length of spikelets 2.4–3.7 mm (5).
5(4). Spikelets 2.4–3 mm long; inflorescence axis usually 0.5–2 cm long ..... **B. distachya**
5. Spikelets 3.3–3.7 mm long; inflorescence axis usually 3–10 cm long .. **B. subquadripara**

Brachiaria reptans (L.) Gard. & C.E. Hubb. **New state record**

The following collection documents a new state record for a naturalized grass. *Brachiaria reptans*, native to tropical Asia, is known from a single collection made on O‘ahu.

Material examined. **O‘AHU**: Honolulu, Bishop Museum courtyard, 4 Oct 1946, *Neal s.n.* (BISH 119991).

Bromus

KEY TO THE SPECIES OF *BROMUS* IN HAWAI‘I

1. Lemmas strongly laterally compressed and keeled ..... **B. catharticus**
1. Lemmas rounded on the back (2).
2(1). Lower glume 3–7-veined; spikelets lanceolate to ovate, tapering towards the top; lemmas awned (3).
2. Lower glume 1-veined; spikelets oblong or cuneate, gaping at the top (5).
3(2). Lemma margins inrolled below middle, the lemma 7–9 mm long; leaf-sheaths usually glabrous ..... **B. secalinus**
3. Lemma margins flat; leaf-sheaths hairy (4).
4(3). Panicle dense, erect; pedicels shorter than spikelets ..... **B. hordeaceus**
4. Panicle lax, nodding; pedicels longer than spikelet ..... **B. japonicus**
5(2). Plants perennial, rhizomatous; spikelets oblong; lemmas awnless ..... **B. inermis**
5. Plants annual; spikelets cuneate (6).
6(5). Lemmas 20–35 mm long ..... **B. diandrus**
6. Lemmas 9–20 mm long (7).
7(6). Panicle drooping, open, the branches mostly longer than spikelets (8).
7. Panicle erect, dense, the branches mostly shorter than spikelet (9).
8(7). Panicle branches simple, each bearing 1(-3) spikelets ..... **B. sterilis**
8. Panicle branches divided, each bearing at least 4 spikelets ..... **B. tectorum**
9(7). Panicle loose; branches partly visible, 10–30 mm long ..... **B. madritensis**
9. Panicle densely contracted; branches hidden, 1–10 mm long ..... **B. rubens**

Bromus catharticus Vahl **Taxonomic change**

Much of the literature concerning *Bromus catharticus* in Hawai‘i appears under its synonyms *Bromus willdenowii* Kunth and *B. unioloides* Kunth.

Bromus rigidus Roth **Taxonomic note**

Bromus rigidus Roth (O’Connor, 1990: 1508) is treated as a subspecies of *B. diandrus* by Tsvelev (1983: 324), but in the genus *Anisantha* (*Anisantha diandra* ssp. *rigida* (Roth) Tsvel). Although we agree that *B. rigidus* is probably best considered a subspecies of *B. diandrus*, the final consensus for placing the taxa in the genus *Anisantha* is yet to be determined.

Bromus hordeaceus L. **Taxonomic change**

There is much disagreement over several closely allied species of *Bromus*. In this treatment we have followed the taxonomy of Smith (1980: 187) as given in the *Flora Europaea* where *B. mollis* L. (O’Connor, 1990: 1507) is considered a synonym of *B. hordeaceus*, and *B. molliformis* Lloyd (O’Connor, 1990: 1505) becomes subsp. *molliformis* (Lloyd) Maire & Weiler.

Calamagrostis

Calamagrostis expansa (Munro ex Hillebr.) Hitchc. **New island record**

Formerly considered endemic to the island of Maui, *Calamagrostis expansa* has recently been discovered on the island of Hawai‘i.

Material examined. **HAWAI‘I**: South Kona District, Kohala Mts., above Honokana Nui Stream north of twin ‘Āwini bogs, 4330 ft, 28 Nov 1995, *Wood and Perlman 4807* (BISH); above Honokana Nui Stream, third bog west of USGS Trail near cabin, 4300 ft, 15 Nov 1995, *Wood 4739* (BISH); 2 other collection from bogs in the area: 29 Nov 1995, *Wood and Perlman 4811* (BISH), 15 Nov 1995, *Wood 4751* (BISH).

Cenchrus

New state records published in prior papers have added species to our flora which are not included in the generic key in O’Connor (1990: 1511). The following key will aid in their identification.

KEY TO THE SPECIES OF *CENCHRUS* IN HAWAI‘I

1.	Bristles or spines antrorsely barbed (2).
1.	Bristles or spines retrorsely barbed (3).
2(1).	Inner bristles ciliate, flexuous, united only at base to form a shallow disc 0.5–1.5 mm in diameter (often mistaken for *Pennisetum* if disc and basal flattening of inner bristles overlooked) ..... **C. ciliaris**
2.	Inner bristles glabrous, rigid, flattened, connate for 1/4–2/3 of their length to form a cup ..... **C. setigerus**
3(1).	Spines connate only at the base to form a shallow cup ..... **C. agrimonioides**
3.	Spines connate for at least 1/2 their length to form a globose bur (4).
4(3).	Bur subtended by whorl of finer spines at its base ..... **C. echinatus**
4.	Bur with finer spines emerging irregularly from its surface ..... **C. tribuloides**

Chloris

Chloris barbata Sw. **New island record**

The following collection documents this species from the island of Kaho‘olawe. It is now known from all of the main islands.

Material examined. **KAHO‘OLAWE**: Windswept plateau toward east end, 200–400 m, 14 Feb 1931, *Bryan 733* (BISH).

Chloris virgata Sw. **New island record**

Based upon the specimen cited below, *Chloris virgata* has now been documented from all the main islands except Ni‘ihau.

Material examined. **O‘AHU**: One mile west of Kahuku, by the road, 100 ft, Feb 1975, *Uta’i 8* (BISH).

Cymbopogon

Cymbopogon refractus (R. Br.) A. Camus **New island records**

The following collections represents new island records from the islands of Ni‘ihau and Lāna‘i. *Cymbopogon refractus* is now known from all the main islands except Kaho‘olawe.

Material examined. **NI‘IHAU**: One half mile northeast of Ki‘eki‘e, pasture grass, 400 ft, 14 Aug 1947, *St. John 22794* (BISH); **LĀNA‘I**: Common near Pu‘u Manu, 2000 ft, 8 Nov 1987, *Nagata 3716* (BISH).

Cynodon

KEY TO THE SPECIES OF *CYNODON* IN HAWAI'I

1. Plant with stolons and underground rhizomes .....**C. dactylon**
1. Plant with stolons but no rhizomes (2).
2(1). Culms robust, woody; racemes in 2–5 whorls (rarely 1), stiff, red or purple .... **C. aethiopicus**
2. Culms soft, not woody; racemes in 1 whorl (occasionally 2), slender, green or pigmented ..... **C. nlemfuensis**

Cynodon aethiopicus Clayton & J.R. Harlan **New state record**

The following collections document this new state record from the islands of O'ahu and Hawai'i; the specimens cited below had incorrectly been identified as *C. dactylon* and filed under that name. There are 3 sheets of *Cynodon* in BISH collected by Herbert Shipman on the 29 January 1963. Two of the specimens, labelled "Super Giant Bermuda," are of this species, the 3rd sheet, labelled "Giant Fuzzy Bermuda," is of *C. nlemfuensis* as reported by O'Connor (1990: 1520).

Material examined. **O'AHU**: Hickam Field, 29 Nov 1945, *OHS* [*Otto H. Swezey*], *s.n.* (BISH 16662); **HAWAI'I**: Kona, Honomolino near Miloli'i Junction, James Stuart's Ranch, 1900 ft, 22 Apr 1962, *Lyman s.n.* (BISH 118470, 118472); Hawai'i, 29 Jan 1963, *Shipman s.n.* (BISH 118466).

Cynodon dactylon (L.) Pers. **New island record**

The following collection documents the presence of this species on the island of Moloka'i; it has now been reported from all the main Hawaiian islands except Ni'ihau.

Material examined. **MOLOKA'I**: Mo'omomi, creeping grass on sand dune, 30 Oct 1986, *Takeuchi & Imada 3251* (BISH).

Dichanthium

Dichanthium aristatum (Poir.) C. E. Hubb. **New island record**

Formerly reported from Kaua'i, O'ahu, Lāna'i, and Maui (O'Connor, 1990: 1528), *Dichanthium aristatum* is here documented from the island of Kaho'olawe for the first time.

Material examined. **KAHO'OLAWE**: Makawao District, southwest coast near Hanakanaea, 50 ft, abundant near Navy base, 19 Mar 1992, *Wood et al. 1735* (BISH).

Dichanthium tenue (R. Br.) A. Camus **New island records**

The following collections document the presence of *Dichanthium tenue* on the islands of O'ahu and Maui. It formerly was known only from Ni'ihau and Hawai'i (O'Connor, 1990: 1528).

Material examined. **O'AHU**: Malaekahana, along roadways in *Leucaena* thickets, 200 ft, 21 Dec 1988, *Nagata 3934* (BISH); **MAUI**: 'Ulupalakua, Makawao, in pasture, 1940, *Ripperton s.n.* (BISH 447069).

Dichelachne Endl.

Dichelachne micrantha (Cav.) Domin **Taxonomic change**

The plant treated by O'Connor (1990: 1482) as *Dichelachne sciurea* (R.Br.) J.D. Hook. is considered conspecific with *Dichelachne micrantha* in the treatment of the genus by Veldkamp (1974: 9).

Digitaria

KEY TO THE SPECIES OF *DIGITARIA* IN HAWAI'I

1. Raceme rhachis broadly winged, flat, with rounded midrib; spikelets ternate (2).
1. Raceme rhachis with or without narrow wings, the midrib angular; spikelets paired (3).
2(1). Spikelets pubescent, often obscurely so, fruit dark brown to black ..... **D. violascens**
2. Spikelets glabrous; fruit pallid to light brown ..... **D. fuscescens**
3(1). Plants perennial (4).
3. Plants annual; spikelets pubescent (often obscurely so) to villous without conspicuous ribs (6).
4(3). Spikelets all quite glabrous, not ribbed; lower glume obvious as a triangular scale up to 1 mm long ..... **D. abyssinica**
4. Spikelets, or some of them, hairy (5).
5(4). Racemes numerous on a central axis; spikelets villous, the hairs extending 1–2 mm beyond tip ..... **D. insularis**
5. Racemes digitate or subdigitate ..... **D. eriantha**
6(3). Rhachis margins smooth; sterile lemma 5-veined, the laterals contiguous (thus apparently 3-veined); upper glume 1/3–2/3 length of spikelet ..... **D. radicosa**
6. Rhachis margins scabrid; sterile lemma 7-veined (7).
7(6). Upper glume 1/8–1/4 length of spikelet; lower glume absent; spikelets 2–3 mm long .... **D. setigera**
7. Upper glume 1/3–4/5 length of spikelet (8).
8(7). Upper glume 1/3–1/2 length of spikelet; lower glume tiny, but distinct; spikelets 2–2.5 mm long; inflorescence with a central axis up to 7 cm long ..... **D. horizontalis**
8. Upper glume(1/2–)2/3–4/5 length of spikelet; inflorescence digitate or subdigitate .... **D. ciliaris**

Digitaria abyssinica (A. Rich.) Stapf **New state record**

The collections of *Digitaria abyssinica* listed below document a new state record. Collections of the plant were made from experimental grass plots on O'ahu and Maui in 1940 and 1943, respectively, but at that time it was not known to be naturalized in Hawai'i. It is an African species.

Material examined. **KAUA'I**: Kalaheo, 29 Aug 1946, *Au, s.n.* (BISH 448776); **MAUI**: Olinda, Forestry House, 3850 ft, Mar 1979, *Hobdy 434* (BISH).

Digitaria eriantha Steud. **Taxonomic change and correction**

Digitaria pentzii Stent (O'Connor, 1990: 1530) is a stoloniferous variant of *D. eriantha* and was placed in synonymy under the latter species by Gibbs Russell *et al.* (1990: 110). Although O'Connor cites a 1963 Shipman collection from the island of Hawai'i as the earliest documentation of the species in the state, the first collection actually was from an experimental grass plot on Maui in 1939 (*Hosaka 2446*); it also was cultivated on O'ahu at about the same time. The earliest collection of the grass as a naturalized species probably was that of Fagerlund and Mitchell in 1942.

Material examined. **O'AHU**: Hawai'i Agricultural Experimental Station, Pensacola, 200 ft, 10 Aug 1940, collector unknown (BISH 448178); **MAUI**: Makawao, Haleakala Branch Agricultural Experimental Station, 9 Apr 1939, *Hosaka 2446* (BISH); **HAWAI'I**: Volcano House garden, 1 Dec 1942, *Fagerlund & Mitchell 224* (BISH).

Digitaria radicosa (J. Presl) Miq. **New island record**

The following collection documents a new island record for *D. radicosa* on the island of Kaua'i. The species formerly was known only from O'ahu.

Material examined. **KAUA'I**: Lawa'i Valley, National Tropical Botanical Garden, Bamboo Bridge area, 3 Oct 1983, *Flynn 625* (BISH).

Echinochloa

KEY TO THE SPECIES OF *ECHINOCHLOA* IN HAWAI'I

1. Ligule represented by a fringe of hairs ..... **E. picta**
1. Ligule absent (2).
2(1). Spikelets acuminate to awned, in 2-several irregular rows; longest raceme 2–10 cm long (3).
2. Spikelets acute to cuspidate; racemes seldom over 3 cm long, simple (4).
3(2). Spikelets mostly 3–4 mm long; upper floret 2–3 mm long; lowest raceme often with secondary branchlets ..... **E. crusgalli**
3. Spikelets 3.8–6.5 mm long; upper floret 3.5–5 mm long; racemes all simple..... ..... **E. oryzoides**
4(2). Racemes neatly 4-rowed, spikelets openly spaced, commonly about 1/2 their length apart, appressed to the axis, 1.5–3 mm long; lower floret male or barren ..... **E. colona**
4. Racemes crowded with plump spikelets, congested into a dense lanceolate head; spikelets 2.5–4 mm long, purple tinged; lower floret barren ..... **E. utilis**

Echinochloa oryzoides (Ard.) Fritsch **New state record**, **misidentification**

The 2 collections cited below represent a new state record. The species, native to the Mediterranean and Middle East, has not been collected in Hawai'i since 1930, and in all probability it is no longer in the state. The collections in BISH were originally incorrectly identified as *Echinochloa stagnina* (Retz.) P. Beauv., a species that apparently is not in Hawai'i.

Material examined. **O'AHU**: Honouliuli rice fields, 31 May 1928, *van Zwaluwenberg s.n.* (BISH 448746, 118762, 118763); Honolulu, Kapahulu Road, Parmelee's Nurseries, 17 Dec 1930, *Wilder s.n.* (BISH 118816).

Echinochloa picta (J. König) P.W. Michael **New state record**, **misidentification**

The following collection was originally identified by O'Connor (1990: 1534) as *Echinochloa stagnina* (Retz.) P. Beauv. It is the only known collection of *E. picta* in Hawai'i, and its present status is unknown. *Echinochloa picta* is native to tropical Asia.

Material examined. **O'AHU**: Pearl Harbor Peninsula, in rice paddies, 15 ft, 30 Mar 1927, *Haddon 307* (BISH).

Echinochloa utilis Ohwi & Yabuno **New state record**

The following collection represents a new state record. Japanese millet has been cultivated on the island of Hawai'i in the past, but this is the only record of it as a volunteer. It probably was introduced as a contaminant in the grass seed planted in the experimental plot. The status of the species in Hawai'i is unknown, but it is included here to call attention to the possibility that the species still may occur as a member of the local weed flora. *Echinochloa utilis* is native to Japan and China.

Material examined. **MAUI**: East Maui, 'Ulupalakua, Makawao, volunteer in experimental grass plot, 3000 ft, 13 Apr 1937, *Hosaka 1799* (BISH).

Echinochloa walteri (Pursh) Heller **Misidentification**

The collection cited by O'Connor (1990: 1534) as *E. walteri* was an incorrectly identified specimen of *E. crusgalli* (L.) P. Beauv. *Echinochloa walteri* has not been documented from the Hawaiian Islands.

Material examined. **O‘AHU**: Wai‘anae, Makaha Valley, along bank of reservoir, 100 ft, 17 Jun 1936, *Hosaka 1378* (BISH).

Ehrharta

Ehrharta erecta Lam. **New state record**

Although collections of *Ehrharta erecta* from experimental grass plots at the Hawai‘i Agricultural Experimental Station on Haleakalā were made in 1937 and 1943, this is the first documented naturalized collection of the species. It differs from *E. stipoides*, the only other species of the genus in Hawai‘i, by its often rugose, obtuse, awnless sterile lemmas. The sterile lemmas of *Ehrharta stipoides* are attenuate and awned. The species is native to Africa.

Material examined. **MAUI**: Makawao Dairy, 23 Apr 1979, *Hobdy 492* (BISH).

Ehrharta stipoides Labill. **New island record**

The following collection represents a new island record for this species. It previously was known from O‘ahu, Maui, and Hawai‘i (O’Connor, 1990: 1536), and recently was reported from Kaua‘i (Lorence *et al.*, 1995: 45).

Material examined. **KAHO‘OLAWE**: Smuggler’s Cove, 25 Jan 1991, *Ellshoff 196* (BISH).

Eragrostis

KEY TO THE SPECIES OF *ERAGROSTIS* IN HAWAI‘I

1.	Spikelets falling entire, ovate, 6–16 mm long ..... **E. superba**
1.	Spikelets breaking up at maturity (or persistent in *E. tef*) (2).
2(1).	Rhachilla fragile throughout, its internodes falling with the adjacent floret; palea keels conspicuously ciliate (3).
2.	Rhachilla tough and persisting after the lemmas have fallen, at least in the lower half; palea keels glabrous or obscurely ciliolate (4).
3(2).	Panicle spiciform, woolly, often more or less interrupted; lemmas, or at least the upper, with a few short stiff hairs on lower part of keel ..... **E. ciliaris**
3.	Panicle open, pyramidal to elliptic, rarely contracted and linear; lemma keels glabrous... ..... **E. amabilis**
4(2).	Plants annual (sometimes short-lived perennial in *E. parviflora* and *E. unioloides*) (5).
4.	Plants perennial (10).
5(4).	Leaf-blades with wart-like glands on the margins; spikelets pallid green to leaden grey; paleas persistent ..... **E. cilianensis**
5.	Leaf-blades without glands on the margins (6).
6(5).	Palea deciduous (but florets falling very tardily in *E. tef*) (7).
6.	Palea persisting on rhachilla at maturity (9).
7(6).	Spikelets ovate, 2–3.4 mm wide, the florets closely imbricate; panicle branches not whorled ..... **E. unioloides**
7.	Spikelets linear to oblong, 0.7–2 mm wide; lowest panicle branches whorled (8).
8(7).	Lemmas 2–2.7 mm long; grain oblong, 1–1.2 mm long; panicle axils glabrous or bearded ..... **E. tef**
8.	Lemmas 1–1.6 mm long; grain ellipsoid, 0.6–1 mm long; panicle axils bearded..... ..... **E. pilosa**
9(6).	Lowest panicle branches whorled; leaf-blades flat or involute, 2–5 mm wide . **E. parviflora**
9.	Lowest panicle branches not whorled ..... **E. pectinacea**
10(4).	Panicle not or scarcely emergent from basal leaves, contracted, linear; leaf-blades rigid, erect, forming a cushion 5–20 cm high ..... **E. paupera**
10.	Panicle exserted well above basal leaves (11).
11(10).	Upper glume as long as adjacent lemma or almost so (12).
11.	Upper glume shorter than adjacent lemma (15).

12(11). Panicle open, lanceolate to ovate, the branches spreading or ascending; leaf-blades mostly flat, 2–4 mm wide (13).
12. Panicle contracted, linear, the branches appressed; leaf-blades mostly convolute, 1–2 mm wide (14).
13(12). Spikelets linear, 8–15-flowered; palea deciduous ..... **E. atropioides**
13. Spikelets oblong, 4–7-flowered; palea persistent ..... **E. deflexa**
14(12). Culms 60–100 cm high; leaves basal and cauline; panicle 15–30 cm long **E. leptophylla**
14. Culms 10–30 cm high; leaves basal; panicle 5–15 cm long ..... **E. monticola**
15(11). Leaf-blades coriaceous, stiff, 5–10 mm wide; culms robust, erect, 40–100 cm high, in a dense tuft; spikelets dark to greyish green (16).
15. Leaf-blades herbaceous; culms of moderate to slender stature (18).
16(15). Panicle contracted to spiciform, linear to lanceolate, the branches at lower nodes less than 6 cm long ..... **E. variabilis**
16. Panicle open, elliptic to ovate, the branches at lower nodes more than 6.5 cm long (17).
17(16). Glumes and lemmas glabrous ..... **E. grandis**
17. Glumes, and sometimes lemmas, long ciliate ..... **E. fosbergii**
18(15). Basal leaf-sheaths silky pubescent below and ridged ..... **E. curvula**
18. Basal leaf-sheaths glabrous (19).
19(18). Basal leaf-sheaths strongly laterally compressed; spikelets dark green, the lemma tips free giving a serrate outline ..... **E. tenuifolia**
19. Basal leaf-sheaths not flabellate; spikelets not obviously serrate (20).
20(19). Spikelets subsessile (pedicels less than 0.5 mm) in dense glomerate clusters ... **E. elongata**
20. Spikelets pedicelled (21).
21(20). Lateral pedicels 1–2 mm long, eglandular, the spikelets borne close to the primary branches ..... **E. brownii**
21. Lateral pedicels 2–15 mm long, filiform, the spikelets evenly distributed (22).
22(21). Pedicels 2–6 mm long, with an annular gland ..... **E. leptostachya**
22. Pedicels 5–15 mm long, eglandular (23).
23(22). Panicle effuse with sinuous branches; culms 60–160 cm high; spikelet oblong, the florets spreading at 30–45 degrees from the rhachilla ..... **E. trichodes**
23. Panicle moderately divided with straight branches; culms 30–40 cm long; spikelets linear, the florets appressed to the rhachilla ..... **E. mauiensis**

Eragrostis curvula (Schrad.) Nees **New state record**, **misidentification**

The following collections of *Eragrostis curvula* represent the 1st documentation of the species on the northern Pacific islands. The 2 Kahoʻolawe specimens cited below were originally identified as *Leptochloa uninervia* (Presl) Hitchc. & Chase (Warren & Herbst, 1994; Warren *et al.*, 1994), a species which it superficially resembles; *E. curvula* can be distinguished by the presence of minute striations and silky hair at the base of the leaf sheaths.

Material examined. **OʻAHU**: ʻEwa, mauka of Varona Village, uncommon in abandoned sugar cane fields, 23 m, 1 Oct 1996, *Nagata 4437* (BISH); **KAHOʻOLAWE**: 1.25 mi due east of Puʻu Muiwi, volunteer in an erosion control test plot, 305 m, 24 Apr 1989 *Aschermann s.n.* (BISH 634250); Southeast of Lua Makika in experimental planting area, 16 Jan 1990, *Warren s.n.* (BISH 634223).

Eragrostis deflexa Hitchc. **New island record**

The following collection represents a new island record from the island of Maui. *Eragrostis deflexa* was previously believed to be endemic to the islands of Lānaʻi and Hawai`i.

Material examined. **MAUI**: West Maui, slopes of Lihau, 27 Jan 1987, *Hobdy 2704, 2705, 2709* (BISH).

Eragrostis grandis Hillebr. **New island record**

The following specimen is poor and scappy, but appears to fit this species, at least the low, dry area form. This endemic species of lovegrass is now known from all the main islands of Hawai‘i except Ni‘ihau.

Material examined. **KAHO‘OLAWE**: Central-western part of the island and below Lua Keālialalo, 700 ft, 22 Apr 1980, *Cuddihy & Char 364* (BISH).

Eragrostis leptophylla Hitchc. **New island record**

The following collection represents a new island record for *E. leptophylla*. It previously was believed to be endemic to the islands of Lāna‘i, Maui, and Hawai‘i.

Material examined. **KAHO‘OLAWE**: Makawao District, ‘Ale‘ale Stack, near Pu‘u Koa‘e, 70 meters, 17 May 1992, *Wood et al. 1923* (BISH).

Eragrostis leptostachya (R. Br.) Steud. **New name and status**

Eragrostis leptostachya, a native of Australia, is naturalized in England and Belgium (where it was introduced with wool from Australia), and Easter Island and Hawai‘i. *Eragrostis hosakai* Degener, which was known only from the type collection on Moloka‘i, was recently cited as a new synonym of this species by Lazarides (1997: 131). The following collection represents a second record of the species in Hawai‘i.

Material examined. **MOLOKA‘I**: Makolelau, below and west of Pu‘u Kolekole, second drainage to the east of the nearby contour road, abundant on windswept ridges and slopes, 2750–2800 ft, 27 Feb 1997, *Wood 6039* (BISH).

Eragrostis molokaiensis St. John **Taxonomic change**

The holotype of this species, listed below, has been determined to be *Eragrostis brownii* (Kunth) Nees ex Steud., a species native to Australia, which is naturalized in Hawai‘i on the islands of Moloka‘i, Maui, and Hawai‘i.

Material examined. **MAUI**: East Maui, Haleakalā Crater National Park, between Hosmer’s Grove and Park Headquarters, in heath shrub, along trails only, 7000 ft, 21 Jul 1969, *Henrickson 3947* (holotype of *E. molokaiensis* St. John) (BISH).

Eragrostis pectinacea (Michx.) Nees **New island record**

Eragrostis pectinacea has been documented from the island of Moloka‘i; it previously was known in the Hawaiian Islands from the islands of O‘ahu, Lāna‘i, Maui, and Hawai‘i.

Material examined. **MOLOKA‘I**: East Kamiloloa Ridge, moist soil in a small erosion gully, 1200 ft, 23 Jan 1983, *Char & Hall 83.006* (BISH); Kamakou Preserve, Kawela Section, upper Onini Gulch, 2800 ft, 28 May 1982, *Cuddihy 1223* (BISH).

Eragrostis pilosa (L.) P. Beauv. **New island record**, **correction**

Based upon the collection cited below, *Eragrostis pilosa* is here reported for the first time from the island of Lāna‘i. Although O’Connor (1990: 1538) cited collections of the species from 3 islands (Moloka‘i, Maui, and Hawai‘i) in his distributional records for this species, these records are based upon misidentifications: the Moloka‘i specimen annotated as *E. pilosa* actually is *E. monticola*, the Maui specimen is *E. pectinacea*, and the Hawaiian specimen (*Forbes 11.H*) is *E. leptophylla*. In an earlier publication, Lorence *et al* (1995: 45) reported the species from Kaua‘i, thus it presently is known from 2 Hawaiian islands, Kaua‘i and Lāna‘i. *Eragrostis pilosa* was first collected on the island of Lāna‘i in 1929 *(Munro 466*, BISH).

Material examined. **LĀNA‘I**: Ka‘a, a grass introduced some years ago, 1500 ft, 21 Nov 1929, *Munro 466* (BISH).

Eragrostis superba Peyr. **New state record**

The following record of *Eragrostis superba* represents the first state record of this species in the Hawaiian Islands. It is naturalized at least at this one locality. It is native to eastern and southern Africa.

Material examined. **HAWAI‘I**: Parker Ranch, in pasture near water tanks south of highway, 16 Mar 1985, *Funk & Hall 252* (BISH).

Eragrostis tenuifolia (A. Rich.) Steud. **New state record**

The following collection citations represent a new state record for *Eragrostis tenuifolia*; it has been documented from 2 islands, O‘ahu and Hawai‘i. It is distributed throughout the tropics.

Material examined. **O‘AHU**: Honolulu, University of Hawai‘i at Mānoa, occasional in lawn, 2 Feb 1988, *Nagata 3796* (BISH); **HAWAI‘I**: South Kohala District, Waimea, along road above Lindsey Subdivision to the Waimea Reservoir, 2800 ft, uncommon, 12 February 1997, *Herbst 9814* (BISH).

Hordeum

KEY TO THE SPECIES OF *HORDEUM* IN HAWAI‘I

1.	Rhachis tough, the spikelets persistent	**H. vulgare**
1.	Rhachis fragile, disarticulating with the spikelets at maturity (2).	
2(1).	Lemma awn 18–50 mm long; weedy annual	**H. murinum**
2.	Lemma awn 5–7 mm long; tufted perennial	**H. brachyantherum**

Hordeum brachyantherum Nevski **New state record**

The following collection documents a new state record; its present status in Hawai‘i is unknown. *Hordeum brachyantherum* is native to East Siberia and North America.

Material examined. **HAWAI‘I**: South Kohala District, Waiki‘i, rare in open pasture, 4000 ft, 18 Sep 1936, *Hosaka 1623* (BISH).

Hordeum leporinum Link **Taxonomic change**

Hordeum leporinum Link (O’Connor, 1990: 1552) is now treated as a subsp. of *H. murinum*: *Hordeum murinum* Huds. subsp. *leporinum* (Link) Arcang, following the taxonomic concepts of Humphries (1980: 205).

Hyparrhenia

Although the 3 species of *Hyparrhenia* naturalized in Hawai‘i previously have been reported in the literature (O’Connor, 1990: 1554; Herbst & Wagner, 1996: 11), there is no key to assist in their identification. The following key is included to rectify this deficiency.

KEY TO THE SPECIES OF *HYPARRHENIA* IN HAWAI‘I

1.	Spikelets with red hairs	**H. rufa**
1.	Spikelets with white hairs or glabrous (2).	
2(1).	Base of individual racemes in the pair filiform, unequal, glabrous or softly hairy	**H. hirta**
2.	Base of individual racemes in the pair flattened, subequal, stiffly setose	**H. dregeana**

Ischaemum

KEY TO THE SPECIES OF *ISCHAEMUM* IN HAWAI'I

1. Lower glume of sessile spikelet distinctly winged above ..... **I. indicum**
2. Lower glume of sessile spikelet not, or obscurely, winged (2).

2(1). Back of rhachis with a basal circular pore between internode and pedicel .. **I. timorense**
2. Back of rhachis without a distinct circular pore ..... **I. byrone**

Ischaemum indicum (Houtt.) Merr. **New state record**

The following collection documents a new state record. *Ischaemum indicum* is native to Africa and Tropical Asia.

Material examined. **MAUI**: Pi'ina'au Valley Road, disturbed roadside by forest reserve gate, 11 Jan 1995, *Hobdy 3726* (BISH).

Koeleria

Koeleria macrantha (Ledeb.) Schult. **Taxonomic change**

This species was incorrectly cited by O'Connor (1990: 1557) as *Koehleria nitida* Nutt., a synonym. *Koeleria macrantha* is native to Europe and temperate Asia, but has been widely introduced to other areas.

Leptochloa

Leptochloa uninervia (C. Presl) Hitchc. & Chase **Correction**

Leptochloa uninervia is presently known in Hawaiian from the islands from Kaua'i, O'ahu, Moloka'i, Maui, and Hawai'i; it was incorrectly reported from Kaho'olawe (Warren & Herbst, 1994), a record based upon misidentified specimens of *Eragrostis curvula*.

Leymus

Leymus triticoides (Buckley) Pilger **New state record**

A single collection of *Leymus triticoides* made in 1936 indicates that this species was naturalized in at least 1 locality in Hawai'i at that time; its present status is unknown.

Material examined. **HAWAI'I**: North Hilo District, Mauna Kea, Humu'ula Sheep Station, occasional in open pastures, 12 Sep 1936, *Hosaka 1605* (BISH).

Lolium

Lolium multiflorum Lam. **New island record**

The following collection extends the range of *Lolium multiflorum* to include the island of Moloka'i; it is now documented from all the main islands except Ni'ihau, Lāna'i, and Kaho'olawe.

Material examined. **MOLOKA'I**: Poholua, Jun 1912, *Forbes 99.Mo* (BISH).

Melinis

KEY TO THE SPECIES OF *MELINIS* IN HAWAI'I

1. Spikelets villous with silky pink, tan, or silvery hairs, without prominent veins; leaves scentless ..... **M. repens**
1. Spikelets glabrous or occasionally pubescent, with conspicuously ribbed veins; leaves smelling of linseed oil ..... **M. minutiflora**

Melinis repens (Willd.) Zizka **Taxonomic change**

In a detailed discussion of the genera, Zizka (1988: 55) stated that the African species of *Melinis* and *Rhynchelytum* intergrade to such an extent that to maintain the separation of the genera is untenable. *Tricholaena* is accepted as a valid genus, but is not in

Hawai‘i. *Rynchelytrum repens* (Willd.) Hubbard, *R. roseum* Stapf & Hubbard ex Bews, *Tricholaena repens* (Willd.) Hitchc., and *T. rosea* Nees are names occurring in the Hawaiian literature for this taxon.

Muhlenbergia

Muhlenbergia mexicana (L.) Trin. **New state record**

A second species of *Muhlenbergia* is here reported for the Hawaiian Islands. It is known from a single collection made on Maui in 1933, and its present status is unknown. It differs from *Muhlenbergia microsperma*, the other species of the genus naturalized in Hawai‘i by its mucronate lemmas that are about as long as the glumes, and its contracted panicle inflorescence; in contrast, *Muhlenbergia microsperma* has lemmas with a flexuous awn, the glumes are about 1/3 the length of the lemmas, and its inflorescence is an open panicle. It is native to North America and northern South America.

Materials examined. **MAUI**: Makawao, 5 Sep 1933, *St. John s.n.* (BISH 456802).

Panicum

Panicum coloratum L. **Correction**

Although O’Connor (1990: 1567) gives the distribution of this species in Hawai‘i as the islands of Maui and Moloka‘i, there is but 1 authentic specimen of *Panicum coloratum* in the herbarium at the Bishop Museum, a collection by Hosaka (*Hosaka 2448*, cited by O’Connor) cultivated in an experimental grass plot on Maui. A second specimen (*Takeuchi & Imada 2970*) from Moloka‘i, originally identified as *P. coloratum*, appears to be an unknown species of *Panicum*. Apparently *P. coloratum* is not naturalized in Hawai‘i.

Material examined. **MAUI**: Makawao, Haleakalā Branch Substation, Hawaii Agricultural Experimental Station, 4 Sep 1939, *Hosaka 2448* (BISH); **MOLOKA‘I**: Mo‘omomi, common bunchgrass in proposed sand-mining tract (parcel 8), 30 Oct 1986, *Takeuchi & Imada 2970* (BISH).

Panicum fauriei var. ***carteri*** **New island record**
(Hosaka) Davidse

Formerly reported from O‘ahu, Moloka‘i, and Maui, *Panicum fauriei* var. *carteri* has now been documented from Lāna‘i.

Material examined. **LĀNA‘I**: Kukui Point, near sea level, 7 Mar 1993, *Hobdy et al. 3581* (BISH).

Panicum fauriei Hitchc. var. ***fauriei*** **New island record**

Based upon the following specimens, the nominate variety of *Panicum fauriei* also has now been documented from the island of Lāna‘i. This variety has been documented from all the main islands except Ni‘ihau and Kaua‘i.

Material examined. **LĀNA‘I**: between Manele and Hulupo‘e Bays, uncommon in sand in *Prosopis* thickets, 1 Sep 1985, *Nagata 3359* (BISH); Manele Bay, common in acrid scrub behind Manele Bay, 100 ft, 7 Sep 1985, *Nagata 3372, 3373* (BISH).

Panicum koolauense H. St. John & Hosaka **New island record**

The following collection represents a new island record, the first record of this species outside the summit of the central Ko‘olau Mountain range on O‘ahu. The species was treated in O’Connor (1990: 1526) as *Dichanthelium koolauense* (St. John & Hosaka) C.A. Clark & Gould following the taxonomy of Clark & Gould (1978). Most botanists now accept *Dichanthelium* as a subgenus of *Panicum*.

Material examined. **MAUI**: West Maui, Keahikauō Bog, ‘Eke Trail, 3000 ft, 22 Oct 1980, *Hobdy 933* (BISH); West Maui, ‘Eke Crater, 4450 ft, 9 Nov 1982, *Medeiros et al. 321,* (BISH).

Panicum longivaginatum St. John **Taxonomic change**

In 1987, shortly before the *Manual of the flowering plants of Hawai‘i* was sent to press, St. John (1987) published 32 new species and varieties of *Panicum*. One of St. John’s new taxa, *P. lineale*, was accepted in the *Manual*; we here accept a second taxa, *P. longivaginatum,* as being sufficiently distinct to warrant recognition at the specific level. *Panicum longivaginatum* is perennial, 62–71 cm tall, the entire plant nearly glabrous; leaf sheath 5–11 cm long, pilose ciliate, blade 10–13 mm wide; panicle 11–13 cm long; spike 2.8–3.1 mm long, fusiform-elliptic; lower glume 0.3–0.6 mm long, fan–shaped. The characteristic features that set this species apart from other members of the genus in Hawai‘i are its stiff lanceolate leaves and short clasping lower glume.

Material examined. **HAWAI‘I**: South Hilo District, Upper Waiakea Forest Reserve, Power Line Road, pole 27, ca 2 mi south of the junction with the Saddle Road, 5300 ft, 21 Jul 1981, *Gustafson 2400* (BISH - type).

Panicum pellitum Trin. **New island record**

Although Hooker & Arnott (1832: 100) merely state “Sandwich Islands” for the type locality of *Panicum affine* Hook. & Arnott, the label on the holotype clearly indicates that the type locality is the island of O‘ahu. As *P. affine* is considered a synonym of *P. pellitum* (O’Connor, 1990: 1571), this specimen extends the distributional range of *P. pellitum* to O‘ahu; it also is recorded from the islands of Ni‘ihau, Lāna‘i, Maui, and Hawai‘i (O’Connor, 1990: 1571).

Material examined. **O‘AHU**: a photograph of the holotype (K) in BISH.

Panicum tenuifolium Hook. & Arn. **New island record**

Based upon the following collection, *Panicum tenuifolium* has now been documented from all the main islands except Ni‘ihau and Kaho‘olawe.

Material examined. **KAUA‘I**: Waimea Canyon State Park at the beginning of Kukui Trail, 1 Aug 1969, *Henrickson 4060* (BISH).

Paspalidium

Paspalidium distans (Trin.) Hughes **New state record**

St. John (1973: 35) lists 2 species of *Paspalidium* in Hawai‘i: *P. jubiflorum* (Trin.) Hughes and *P. radiatum* Vickery; neither are mentioned in O’Connor’s treatment. *Paspalidium radiatum* is now considered a synonym of *P. distans* (Simon, 1990: 80). The St John reference to *P. jubiflorum* probably comes from Rotar’s compilation of Hawaiian grasses (Rotar, 1968: 285), and apparently is without documentation, but 2 specimens of *P. distans* are extant in the Bishop Museum and this species should be considered as part of the Hawaiian flora. The 2 collections documenting its presence follow:

Material examined. **NI‘IHAU**: Short grass that appeared on its own on Ni‘ihau, 1 Nov 1939, *Munro s.n.* (BISH 640212); Kiekie, cultivated pasture grass, 50 ft, 2 Apr 1949, *St. John 23661* (BISH).

Paspalum

KEY TO THE SPECIES OF *PASPALUM* IN HAWAI‘I

1. Upper glume fringed with a ragged papery wing ..... **P. fimbriatum**
1. Upper glume wingless (2).

2(1). Spikelets with a ciliate fringe from margin of upper glume (3).
2. Spikelets glabrous to pubescent but without a ciliate fringe (5).
3(2). Racemes paired; plant stoloniferous; spikelets yellow ..... **P. conjugatum**
3. Racemes 3–20; plant tufted (4).
4(3). Racemes mostly 3–7; spikelets 2.8–4 mm long ..... **P. dilatatum**
4. Racemes 10–20; spikelets 2–2.8 mm long ..... **P. urvillei**
5(2). Upper floret brown ..... **P. scrobiculatum**
5. Upper floret pallid or yellow (6).
6(5). Spikelets borne singly; racemes paired (rarely 3–5) (7).
6. Spikelets paired (8).
7(6). Upper glume papery, glabrous; spikelets ovate-elliptic, flattened ..... **P. vaginatum**
7. Upper glume thinly coriaceous, obscurely puberulous; spikelets ovate, plump .... **P. distichum**
8(6). Spikelets suborbicular, 1.3–1.4 mm long; racemes numerous (10-)15–60.. **P. paniculatum**
8. Spikelets elliptic, 2–2.7 mm long; racemes few 5–10(-15) ..... **P. macrophyllum**

Paspalum macrophyllum H.B.K. **New state record**

The following collection documents a new state record for *Paspalum macrophyllum*. The species is native to South America.

Material examined. **HAWAI'I**: South Kona, lands of Kapua, makai of main highway below macadamia nut orchard, 351 meters, 12 Mar 1994, *Imada, Char, & Motley 94-9* (BISH).

Pennisetum

KEY TO THE SPECIES OF *PENNISETUM* IN HAWAI'I

1. Inflorescence reduced to a cluster of 2–4 subsessile spikelets enclosed in uppermost leaf-sheath, with long protruding filaments and stigmas ..... **P. clandestinum**
1. Inflorescence a spiciform panicle, conspicuously exserted (2).
2(1). Rhachis of panicle with decurrent wings below scars of fallen involucres; upper lemma coriaceous, shiny, readily deciduous ..... **P. polystachion**
2. Rhachis cylindrical or with angular ribs, but these not expanded into winged brackets below the scars; upper lemma firmly membranous, dull, resembling the lower (3).
3(2). Panicle oblong; spikelets 9–14 mm long; involucral bristles 40–70 mm long, plumose .... **P. villosum**
3. Panicle linear; spikelets 4–8 mm long; involucral bristles 6–40 mm long (4).
4(3). Involucres borne on a linear stipe 1–3 mm long ..... **P. setaceum**
4. Involucres without a stipe, at most with a conical or oblong foot 0.5(–1) mm long (5).
5(4). Peduncle pubescent to hirsute below panicle, involucres containing 1–5 spikelets .... **P. purpureum**
5. Peduncle glabrous below panicle; involucres containing 1 spikelet (6).
6(5). Involucres with 1 bristle noticeably longer than the rest; culms 75–200 cm high; leaf-blades 1–5 mm wide ..... **P. complanatum**
6. Involucres with the inner bristles subequal ..... **P. macrostachyum**

Pennisetum complanatum (Nees) Hemsl. **New state record**

The following collections of *Pennisetum complanatum* document the presence of this species in Hawai'i. It is known to be naturalized on the islands of O'ahu, Lāna'i, and Hawai'i, and is native to Central America.

Material examined. **O'AHU**: Kailua, Ka'imi Farm, in semi-moist place in bull paddock, 13 Nov 1938, *Cooke s.n.* (BISH 120173); **LĀNA'I**: Kaiholenali'ili'i, 2000 ft, 13 Apr 1929, *Munro 404* (BISH); Ka'a, Kanepu'u, local patch in grassy pasture, 1700 ft, 13 Apr 1939, *Hosaka & St. John 1959* (BISH);

HAWAI'I: Pu'u Kapu, Parker Ranch, planted pasture, spreading by seed, 2700 ft, 2 Jun 1932, *Ewart 203* (BISH); In old abandoned garden near Parker Ranch Headquarters, 4 Apr 1936, *Whitney H29* (BISH).

Pennisetum villosum R. Br. **New state record**

The following record of *Pennisetum villosum* represents the first state record of this species in the Hawaiian Islands. It apparently was naturalized at least at this 1 locality, but its present status is unknown. The plant is native to northeastern Africa and Arabia, and has been introduced elsewhere as an ornamental.

Material examined. **HAWAI'I**: North Kona, Hu'ehu'e, growing nicely by Mr. Stillman's house, eaten by horses, Jun 1938, *Vredenberg s.n.* (BISH 120181).

Phalaris

KEY TO THE SPECIES OF *PHALARIS* IN HAWAI'I

1. Spikelets in clusters of 6–7, only the central 1 fertile, the cluster falling as a whole .... **P. paradoxa**
1. Spikelets single, all fertile, their glumes persisting after the spikelets have fallen (2).
2(1). Sterile lemmas 2, equal, broad, chaffy, 1/2–2/3 length of fertile; annual ..... **P. canariensis**
2. Sterile lemmas 1, sometimes 2 but then markedly unequal, subulate or scale-like, less than 1/2 length of fertile (3).
3(2). Glume wings toothed or erose: sterile lemma 1, often reduced to a tiny scale; annual..... ..... **P. minor**
3. Glume wings entire; sterile lemmas 1 or 2, well developed; perennial ..... **P. aquatica**

Phalaris aquatica L. **New state record**

Apparently this species has been naturalized in Hawai'i since 1932, at least, but has consistently been misidentified; the following collections document its presence on 2 Hawaiian islands: Maui and Hawai'i. *Phalaris aquatica* is native to the Mediterranean area, but has been widely introduced to other parts of the world.

Material examined. **MAUI**: Kula, along side of Haleakalā Crater Road near homes, growing in patches and overtopping orchard grass, 20 Jul 1982, *Hobdy 1654* (BISH); Makawao, Haleakalā Branch Station of the Hawaii Agricultural Experimental Station, cultivated, 30 May 1932, *Hosaka 2449* (BISH); **HAWAI'I**: Pu'u Kapu, Parker Ranch, 2,700 ft, 30 May 1932, *Ewart 253* (BISH).

Phalaris tuberosa var. ***stenoptera*** **Correction**
(Hack.) Hitchc.

Two of the specimens cited for the previous species (*Hosaka 2449* and *Ewart 253*) were originally incorrectly identified as *Phalaris tuberosa* var. *stenoptera*; these undoubtedly were the collections referenced by O'Connor in his treatment of Hawaiian grasses (O'Connor, 1990: 1483). There is no evidence that this taxon is in Hawai'i.

Phragmites

Phragmites australis (Cav.) Steud. **Correction**

The specimens listed as *Phragmites karka* (Retz.) Trin. in O'Connor (1990: 1483) are incorrectly identified specimens of *Phragmites australis*, a cosmopolitan species of temperate and subtropical regions.

Polypogon

KEY TO THE SPECIES OF *POLYPOGON* IN HAWAI'I

1. Glumes awnless; pedicel wholly deciduous ..... **P. viridis**
1. Glumes awned (2).

2(1). Plants perennial; glume awns 1.5–3 mm long; pedicel wholly deciduous . **P. interruptus**
2. Plants annual (3).
3(2). Glume awns 4–7 mm long, at least twice length of glume; pedicel disarticulating towards the tip, leaving a persistent stump ..... **P. monspeliensis**
3. Glume awns 0.6–3 mm long, half to 1.5 × length of glume; pedicel wholly deciduous ..... **P. fugax**

Polypogon fugax Nees **New state record**, **correction**

The following collection was identified and cited by Hitchcock (1922: 156) in his treatment of the Hawaiian grasses as *P. lutosa* Poir. (now considered a synonym of *P. interruptus*), an incorrect determination. This specimen is the only documented record of *P. fugax* in Hawai'i, and its present status is unknown.

Material examined. **O'AHU**: Nu'uanu Pali, along face of moist cliff, 17 Jun 1916, *Hitchcock 13789* (BISH, K).

Polypogon viridis (Gouan) Breistr. **Taxonomic change**

Following the taxonomy of Tutin as prescribed in the *Flora Europaea* (Tutin, 1980: 236), *Agrostis semiverticillata* (Forssk.) C. Chr. (O'Connor, 1990: 1494) is now considered a synonym of *Polypogon viridis* (Gouan) Breistr., a species native from S Europe to NW India. *Agrostis* species, such as *Agrostis semiverticillata*, with spikelets falling entire are now included in *Polypogon.*

Rytidosperma

KEY TO THE SPECIES OF *RYTIDOSPERMA* IN HAWAI'I

1. Lemma 3-awned, the laterals 6–8 mm long; lemma with 2 marginal and sometimes 2 dorsal tufts, otherwise glabrous and shiny ..... **R. pilosum**
1. Lemma 1-awned, the lobes with or without a mucro up to 1 mm long ... **R. semiannulare**

Rytidosperma pilosum (R. Br.) Connor & Edgar **Taxonomic change**

During his study of the grass subfamily Arundinoideae in New Zealand, Zotov (1963) recognized that the Australian, Tasmanian, and New Zealand taxa formerly referred to the genus *Danthonia* formed a sufficiently distinct entity to warrant being maintained as a separate genus. He named the genus *Notodanthonia* and transferred into it the 2 species of *Danthonia* naturalized in Hawai'i, among others. Connor & Edgar (1979) transferred the species to *Rytidosperma*, an earlier name. The plant treated as *Danthonia pilosa* R. Br. by O'Connor (1990: 1522) should be considered a species of *Rytidosperma.*

In a recent paper, Linder (1997) proposed a new genus and transferred this species into it forming the new combination *Austrodanthonia pilosa* (R. Br.) H.P. Linder. It is unknown if this new taxonomic concept will be adopted by others working with the Danthonieae.

Rytidosperma semiannulare **Taxonomic change**
(Labill.) Connor & Edgar

The plant treated as *Danthonia semiannulare* R. Br. by O'Connor (1990: 1522) was transferred to the genus *Rytidosperma* following the classification of Connor & Edgar (1979).

Schizachyrum

Schizachyrium scoparium (Michx.) Nash **New island record**

Schizachyrium scoparium has been reported from Kaua‘i (Lorence *et al.*, 1995). The following collections document its presence as a naturalized species on O‘ahu. The earliest records of the species in Hawai‘i are from experimental grass plots on O‘ahu and Maui (*Hosaka 2620, 2459*).

Material examined. **O‘AHU**: Honolulu, Pensacola Street Hawaiian Agricultural Experimental Station, cultivated in a grass plot, 25 Nov 1941, *Hosaka 2620* (BISH); Ko‘olauloa, Pupukea-Paumalu, Ko‘olau Mountains, 600 ft, 5 Dec 1987, *Nagata & Takeuchi 3743* (BISH); Ko‘olauloa, Pupukea-Paumalu, Ko‘olau Mountains, 500 ft, 6 Dec 1987, *Nagata & Takeuchi 3750* (BISH); **MAUI**: Makawao, Haleakalā Substation, Hawaiian Agricultural Experimental Station, 2100 ft, cultivated in a grass plot, 9 Apr 1939, *Hosaka 2459* (BISH).

Setaria

Setaria parviflora (Poir.) Kerguelen **Taxonomic change**

In the classification of M. Kerguelen (1975), this is the correct name for the species referred to *S. gracilis* Kunth by O’Connor (1990: 1592).

Sorghum

KEY TO THE SPECIES OF *SORGHUM* IN HAWAI‘I

1. Racemes fragile, rhizomes present ..... **S. halepense**
1. Racemes tough or tardily disarticulating, rhizomes absent (2).
2(1). Grain large, commonly exposed by the gaping glumes; sessile spikelet persistent .... **S. bicolor**
2. Grain enclosed by the glumes; sessile spikelet persistent or tardily deciduous..... ..... **S. × drummondii**

Sorghum* × *drummondii **New state record**
(Steud.) Millsp. & Chase

Sorghum × *drummondii* is the earliest hybrid name for *S. arundinaceum* × *S. bicolor* crosses. A segregate from this complex is widely grown as a fodder crop under the name *S. sudanense* (Piper) Stapf. It was first collected as a cultivated plant probably on O‘ahu in 1913 (*Forbes s.n.*, BISH 120422).

Representative specimens examined. **O‘AHU**: University of Hawai‘i Mānoa, quarry area, 50 ft, 19 Mar 1966, *Herbst 25* (BISH); Ko‘olau Poko, Waikane Valley, growing in ditch along Kamehameha Highway, 10 ft, 23 Jan 1988, *Nagata 3794* (BISH); Pali Highway, along roadside at runaway truck ramp, 12 Oct 1985, *O’Connor s.n.* (BISH 502873). **LĀNA‘I**: Kanepu‘u, 12 Nov 1929, *Munro 475* (BISH). **HAWAI‘I**: Kohala, cultivated, 100 m, Sep 1924, *Barnum 48* (BISH).

Sporobolus

KEY TO THE SPECIES OF *SPOROBOLUS* IN HAWAI‘I

1. Panicle branches, at least the lower, in whorls; upper glume as long as spikelet (2).
1. Panicle branches not whorled (3).
2(1). Panicle open and pyramidal at maturity; spikelets 1.6–1.8 mm ..... **S. pyramidatus**
2. Panicle spiciform, linear; spikelets 1.8–2.5 mm ..... **S. piliferus**
3(1). Leaf-blades convolute, coriaceous, stiff; panicle spiciform, sometimes untidily so; spikelets 1.5–2.5 mm long ..... **S. virginicus**
3. Leaf-blades herbaceous, flat when fresh (6).
4(3). Stamens 2 (5).
4. Stamens 3 (6).

5(4). Panicle open; spikelets 1.2–1.6 mm long ..... **S. diander**
5. Panicle branches 0.5–2 cm long, distant, appressed to the axis, densely crowded with dark green spikelets 1.5–2 mm long ..... **S. elongatus**
6(4). Panicle narrowly pyramidal; branches slender, flexuous, 5–15 cm long, spreading horizontally at anthesis; upper glume obtuse, 1/4–1/2 as long as spikelet ... **S. pyramidalis**
6. Panicle linear, contracted to spiciform; branches stiff, mostly 1–2 cm long, ascending or appressed to the axis (7).
7(6). Lemma and palea scarcely longer than top of grain at maturity, not gaping; spikelets 1.5–2 mm long; upper glume acute ..... **S. indicus**
7. Lemma and palea exceeding the grain by up to its own length, gaping open; spikelets 2.1–2.5 mm long ..... **S. africanus**

Sporobolus africanus (Poir.) Robyns & Tournay **New island record**, **correction**

All Bishop Museum specimens originally identified as *Sporobolus indicus* R. Br. collected on the island of Maui were misidentified; they are specimens of *Sporobolus africanus*. Also, the specimen of *S. indicus* (*Warren KAH-90-6*, BISH) cited by Warren (1993) as a new island record for the island of Kahoʻolawe actually is this species. *Sporobolus indicus* has not been documented from Maui or Kahoʻolawe, but the following collection represents a new island record for *Sporobolus africanus*

Material examined. **KAHOʻOLAWE**: NE rim of Lua Makika Crater, 448 m, 19 Sep 1990, *Warren KAH-90-6* (BISH).

Sporobolus elongatus R. Br. **New state record**

The following collection documents the presence of *Sporobolus elongatus* as a naturalized species on the island of Lānaʻi. Its present status is unknown. *Sporobolus elongatus* is native to Australia.

Material examined. **LĀNAʻI**: Kamoku, 1500 ft, introduced grass growing in several places on the uplands, 1 Aug 1925, *Munro 706* (BISH).

Sporobolus piliferus (Trin.) Kunth **New state record**

The following collection represents a new state record for *Sporobolus piliferus*. The species is found throughout the tropics.

Material examined. **HAWAIʻI**: Hapuna Beach State Park, on median strip in parking lot, cushiony clumping grass growing in gravelly soil, 25 Feb 1994, *Imada, Char, & Motley 94-3* (BISH).

Sporobolus pyramidalis P. Beauv. **New state record**

The following collection represents a new state record for *Sporobolus pyramidalis*, a species native to Africa and S America.

Material examined. **HAWAIʻI**: Captain Cook, Nokukano Development site makai of belt road, common on rocky substrate along the pasture roads near the wooded part of the site, *Funk s.n.* (BISH).

Trisetum

Trisetum flavescens (L.) P. Beauv. **New state record**

Trisetum flavescens was collected only once in Hawaiʻi, in 1942; it is unknown if the species is still present in the state.

Material examined. **MAUI**: Makawao, Haleakala Substation of the Hawaii Agricultural Experimental Station, in pasture, 2100 ft, 17 Jul 1942, *Hosaka 2603 (BISH).*

Trisetum inaequale Whitney **Correction**

The 6 collections cited below comprise the known collections documenting the presence of *Trisetum glomeratum* (Kunth) Trin.on the island of Lāna‘i. All 6 are misidentified specimens of *Trisetum inaequale*; apparently *T. glomeratum* is not known from the island.

Material examined. **LĀNA‘I**: Waiakeakua, 18 Jul 1927, *Munro 154* (BISH); Ka‘ohai, 19 Mar 1916, *Munro 317* (BISH); Kalama, 19 Mar 1914, *Munro 317* (BISH); and 3 Munro collections without collection numbers, dates, or exact localities also in the Herbarium Pacificum (BISH 120608, 120610, 120611).

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