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Updates to the Hawaiian grass flora: Part 4[1]

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This paper finalizes the work of Faccenda (2022, 2023) and Faccenda *et al.* (2024) in revising the grass flora of Hawai'i by making some nomenclatural changes and publishing a few new naturalizations and reidentifications. I discovered some of these records through work on an atlas of grasses in Hawai'i (http://mauu.net/atlas) as I began to focus more on the native species. During this project I compared herbarium data to the checklist of native grasses on each island (Imada *et al*. in prep.), finding several new island records. Unfortunately, the majority of these records were historic collections from the nineteenth or twentieth centuries that have not been collected again. It is assumed that the majority of these are extirpated. The endemic *Deschampsia nubigena* is also changed to a subspecies of *Deschampsia cespitosa* and neotypified. All specimens examined are stored at BISH unless otherwise noted.

Several grain species have been listed as naturalized in Hawai'i by previous authors (e.g., sorghum, wheat, etc.). However, recent fieldwork and a critical examination of herbarium material has shown that these species are not forming self-sustaining populations, and are rather ephemeral populations continuously being resupplied from spilled seed. In other regions of the world, these species would be defined as casual, waifs, or spontaneous (Brock *et al.* 2019). Brock *et al.* (2019) provides guidance on the publication of naturalizations in Hawai'i, but does not specifically address how these species should be treated. As Brock defines *naturalized* as species that form populations outside of cultivation, these species must be excluded from both the naturalized and questionably naturalized checklists since there is currently no evidence that they are either naturalized or in the process of naturalizing.

Agrostis gigantea Roth **New state record**

Recent fieldwork stumbled upon *Agrostis gigantea* naturalized along the Mauna Kea access road at about 2170 m. The population observed was purely rhizomatous and occupied several hundred feet of roadside, but the area was not rigorously surveyed. This species is native to Eurasia but is widely naturalized across the world (POWO 2025). It is likely that some specimens currently identified as *Agrostis stolonifera* are actually this species, as rhizomes or stolons are needed to diagnose the two species (Barkworth *et al.* 1993) and many specimens exclude the rootstock. *Agrostis stolonifera* has only stolons but no rhizomes, whereas *A. gigantea* has only rhizomes but no stolons (Barkworth *et al.* 1993).

Material examined. **HAWAI'I:** Mauna Kea, about 3 km up the access road on right side, past the grove of trees, dry pasture type habitat dominated by invasive grass, common on roadbank, 2177 m, 19.716314, -155.445596, 10 Jul 2024, *K. Faccenda 3598*.

1. Contribution No. 2025-005 to the Hawaii Biological Survey.

Agrostis sandwicensis Hillebr. **New island records**

When *Agrostis sandwicensis* was published, Hillebrand cited material from both Oʻahu and East Maui. O'Connor (1990) reported *A. sandwicensis* as questionable for Oʻahu, as Hillebrand's specimen was not seen at that time, but the MEL specimen confirms its presence on this island. Another specimen from a foreign herbarium also adds Molokaʻi to this species' distribution. It is therefore considered extirpated from both Oʻahu and Molokaʻi, as it has not been observed in 100 years. It has also not been collected on Kauaʻi since 1916 (*Hitchcock 15507*) but likely persists at the Waiʻaleʻale summit bog (Ken Wood, pers. comm.)

Material examined. **Oʻahu**: n.d., *W. Hillebrand s.n.* (MEL 1520483). **Molokaʻi**: Kamalō, Jun 1909, *A. Faurie 1369* (P).

Alopecurus pratensis L. **Extirpation**

Alopecurus pratensis, published as a new state record by Judziewicz (2017) based on a single collection, should no longer be considered naturalized. The collection site was visited in January 2024 and no plants were seen, nor were any seen on nearby roadsides. This grass likely appeared from imported hay or was perhaps deliberately planted. This species may appear again in high elevation areas of Hawaiʻi or Maui.

Anthephora hermaphrodita (L.) Kuntze **Retraction of naturalization**

Anthephora hermaphrodita was reported as naturalized by Herbst & Clayton (1998) based on one specimen from 1981 at Makapuʻu and has not been recollected since. The Kaʻiwi and Makapuʻu area was searched for this species in the winter of 2023 and it was not found, nor was it found in less exhaustive surveys in 2022. *Anthephora hermaphrodita* should therefore be considered a questionable naturalization in Hawaiʻi until it is relocated.

Arrhenatherum elatius (L.) P.Beauv.
ex J.Presl & C.Presl subsp. ***elatius*** **Nomenclatural note**

The naturalized *Arrhenatherum elatius* in Hawaiʻi is best referred to as the nominate subspecies on the basis of its basal nodes, which are glabrous and not swollen (Barkworth *et al.* 1993).

Avena barbata Pott ex Link **New island record**

Examination of the *Avena* collection at BISH found that all specimens filed as *Avena fatua* from Lānaʻi are actually *A. barbata*.

Material examined. **Lānaʻi**: Kānepuʻu, 04 Mar 1928, *G.C. Munro 308*; Koʻele, 2.5 mi [4.0 km] from junction of Keōmoku and Lānaʻihale road, along Keōmoku Rd, in disturbed dry pasture, 500 ft [150 m], 30 Apr 1975, *D. Herbst 5291a*; mauka of Kanaele, 1500 ft [455 m], 23 Mar 1961, *K. Yoshido 12.*

Avena fatua L. **Correction**

All specimens of *Avena fatua* from Lānaʻi have been reidentified as *A. barbata*. See note above.

Bothriochloa laguroides (DC.) Herter
subsp. ***laguroides*** **Nomenclatural note**

Bothriochloa laguroides is questionably naturalized on Maui and Hawaiʻi (Faccenda 2022). All specimens from Hawaiʻi belong to *B. laguroides* subsp. *laguroides*, following Barkworth *et al.* (2003).

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

O'Connor (1990) notes this species as perhaps occurring on Moloka'i based on *Hitchcock 15286* (US), but did not examine the specimen. A photograph was examined and the identification is now confirmed. The generic placement of this grass is uncertain; it may need to be transferred to *Greeneochloa* just as *Calamagrostis expansa* was moved to *Greeneochloa* based on molecular evidence (Peterson *et al.* 2022b). However, this genus is described as having hairy ovaries, yet *C. expansa* apparently lacks hairy ovaries. Future work should sequence DNA from *C. hillebrandii* to see if it should also be moved to *Greeneochloa*, as it appears the morphological evidence is inconclusive.

Cenchrus agrimonioides Trin. var. ***agrimonioides*** **New island record**

This species was reported from Ni'ihau from 1826 (Hooker & Arnott 1841) and is surely extirpated. Unfortunately, no specimens could be found at this time, although one may yet exist undigitized in a European herbarium.

Cenchrus americanus (L.) Morrone **Correction**

Cenchrus americanus was published as naturalized on Maui by Oppenheimer (2007), who cited material from an agricultural area, where it is likely that the plants were volunteers from spilled seed or potentially planted as a forage crop. As this species is a cultigen, it tends not to form persistent populations, and as such this species should be excluded from the Hawaiian flora.

Cenchrus × ***cupreus*** (Thorpe) Govaerts **Extirpation**

Previously published as naturalized on Maui by Faccenda (2022), a revisit of the Lāhainā site by Danielle Frohlich in 2022 found no persistent plants. As such, this species should no longer be considered naturalized in Hawai'i.

Chloris divaricata R.Br. **Confirmation of naturalization**

Chloris divaricata was previously published as a questionable naturalization on Hawai'i Island by Faccenda (2023). Recent fieldwork has found a population at Pololū, confirming its naturalization.

Material examined. **HAWAI'I:** Kohala, Pololū lookout, roadside near lookout, dry, sunny area, rare, only about 3 plants seen, 145 m, 20.205987, -155.735609, 02 Jan 2024, *K. Faccenda & E. Judziewicz 3252*.

Coix lacryma-jobi L. var. ***lacryma-jobi*** **Nomenclatural note**

Following the treatment of *Coix* in Wu *et al.* (2006), all individuals of *Coix lacryma-jobi* in Hawai'i should be treated as the typical variety.

Deschampsia cespitosa subsp. ***beringensis*** (Hultén) W.E.Lawr. **Correction**

This species was reported as naturalized in Hawai'i based on a misidentification of the native *Deschampsia*. See below.

Deschampsia cespitosa subsp. ***nubigena***

(Hillebr.) Faccenda, **comb. et stat. nov.** **New island record; note**

[Basionym: *Deschampsia nubigena* Hillebr., Fl. Hawaiian Isl. 521 (1888)]

Neotype (designated here): Pu‘u Kukui, near summit, open bog, 1850 m, 24 Sep 1916, *A.S. Hitchcock 14728* (BISH 118559!; isoneotypes: US 00449074 photo!, US 00430392 photo!).

To clarify and stabilize the usage of *Deschampsia nubigena*, this name is first neotypified. None of Hillebrand's original material for *Deschampisa nubigena* could be found, as it was deposited at B (Berlin) and was likely destroyed in WWII. Original material could only be found for the heterotypic synonyms *D. australis* Nees ex Steud. (MEL, US, BISH) and *D. pallens* Hillebr. (BISH). *Hitchcock 14728* was chosen as a neotype, as it comes from the type locality, bears good resemblance to the protologue, and has duplicates.

Deschampsia cespitosa (L.) P.Beauv. is widely distributed in temperate areas of both hemispheres and is traditionally interpreted as a polymorphic species with many subspecies distinguished by geographic and weak morphological separation (Chiapella 2000; Wu *et al.* 2006; Chiapella & Zuloaga 2010). Many North American specimens of *D. cespitosa* were compared to the Hawaiian plants at BISH to understand the differences between *D. nubigena* and *D. cespitosa*.

Measurements claimed to distinguish between *D. nubigena* and *D. cespitosa* are provided by Snow & Davidse (2011), but the measurements provided for *D. cespitosa* are much narrower than the values reported by other authors (e.g. Barkworth *et al.* 1993; Wu *et al.* 2006). When *D. nubigena* is compared against the global variation of *D. cespitosa*, the two species almost entirely overlap in their morphologies. One character commonly found in Hawaiian plants is that the ribs on the upper leaf surface are strongly papillose on most specimens, but some plants are purely scabrous, making this character inconsistent.

Further study is needed into this polymorphic grass, both in Hawai‘i and worldwide. There is great variation within plants in Hawai‘i, which may represent cryptic species or ecotypes. The morphological variation appears to be quite correlated with habitat, with similar morphological forms existing on both Maui and Hawai‘i. Maui appears to have the most morphological diversity, and several ecotypes are briefly described below to illustrate some of the variation on the island. These do not encompass the full range of ecological or morphological diversity, and intermediates are found.

- Plants with elongated internodes and soft leaves, the uppermost leaf often sheathing the inflorescence. This ecotype has the largest florets. Found in bogs and other wet areas at middle elevations on East Maui.
- Plants with leaves that are short (3–10 cm) and needlelike from a basal rosette, with 1–2 reduced cauline leaves produced on flowering culms. Found from bogs on West Maui to the Haleakalā summit, 5000–10000 ft [1500–3000 m] elevation. The type specimen is of this form.
- Similar to form 2 and intergrading with it, but dramatically larger, up to 60 cm tall, with leaves ca. 20 cm long and only found at the dry Haleakalā crater and summit region, >6000 ft [1800 m] elevation.
- A form with soft leaves but with basal internodes contracted. The leaves are ribless or with only minute ribs on their adaxial surface. This form generally has the smallest florets and the panicle branches are more capillary and smooth. It is found in stream beds and waterfalls from ~3000–6000 ft [900–1800 m] elevation.

As both *D. nubigena* & *D. cespitosa* are exceedingly variable species and overlap in their morphology, no justification could be found for maintaining *D. nubigena* as distinct from *D. cespitosa* at the species level. This close relationship has been observed previously, as Hillebrand (1888:520) notes that Hawaiian *Deschampsia* "approaches closely" *D. cespitosa*. Chiapella (2007) also found *D. nubigena* to be closely related to *D. cespitosa* but achieved low resolution in their phylogeny. The population genetically most similar to, and likely the ancestor of, the Hawaiian *Deschampsia* is *D. cespitosa* from North America (Baldwin & Wagner 2010). In the spirit of describing subspecies of *Deschampsia nubigena* based primarily on geography (Clarke 1978; Chiapella 2000; Wu *et al*. 2006), the Hawaiian plants are hereby moved to *D. cespitosa* subsp. *nubigena* **comb**. **nov**.

Deschampsia nubigena has previously been reported from Kauaʻi, Molokaʻi, Maui, and Hawaiʻi (O'Connor 1990). However, Hillebrand (1888) reported this species on Lānaʻi (cited as *D. pallens*), and Skottsberg (1926) also cited a specimen of *Deschampsia* from Hillebrand's herbarium collected on Lānaʻi, confirming this record. Unfortunately, this specimen, as with much of Hillebrand's material, was destroyed in WWII. Given that there have been no collections since, *D. cespitosa* subsp. *nubigena* is assumed to be extirpated from Lānaʻi.

Deschampsia nubigena was also published as occurring in French Polynesia on Mt. ʻOrohena, Tahiti (Welsh 2009; Clayton & Snow 2010). Of the five specimens at BISH, only one (*B.H. Gagné 1561*) has complete spikelets, with the others at various stages of decay. Based on this limited quantity of material, it is unclear at this time whether this population should also be placed in *D. cespitosa* subsp. *nubigena* or a different subspecies.

Deschampsia cespitosa was imported to Hawaiʻi for use as forage in 1913 (HAES n.d.). I could locate no mentions of this grass beyond the initial importation, making it unclear if this grass was distributed or even germinated, thus the subspecies is unknown. Comparison of the specimens identified as *D. cespitosa* subsp. *beringensis* by Snow & Davidse (2011) found them near the edge, but within the range of variation, of the indigenous Hawaiian *Deschampsia* populations. These plants are unusual in that they have long internodes and relatively wide leaves, but are similar to *Forbes 1872.M*, which was collected in 1920, also on East Maui. While this was after *D. cespitosa* was imported, Forbes' notes indicate that this collection was from native-dominated habitat. Based on morphological analysis, the specimens cited by Snow & Davidse (2011) are reidentified as the native *Deschampsia*. The possibility cannot be eliminated that some contemporary Hawaiian populations descend from forage importations or contaminated hay, but molecular techniques would be needed to identify these.

The following description was prepared based on examination of much of the Hawaiian *Deschampsia* collection at BISH:

> Plant perennial, caespitose, (15)30–100 cm tall, nodes glabrous. Leaves clustered in basal rosette, or with elongated internodes, 3–30(40) cm long, up to 1.2–3 mm wide when flattened, appearing cylindrical due to strong inrolling, adaxial surface ribbed, densely papillose with or without scabrites, abaxial surface smooth or with minute scabrites, margins antrorsely scabrous. Sheaths smooth, margins hyaline, sometimes a thickened, knobby, coriaceous auricle observed at collar. Ligules acute, (2)4–8(11) mm long, often splitting longitudinally into 2 lobes. Inflorescence an open panicle, 5–30 cm long, lower branches spreading to partly erect, panicle branches antrorsely scabrous to smooth, pedicel clavate. Spikelets 2-flowered [rarely 3-flowered, only one of this found from

Waiʻānapanapa Lake, *P. Welton et al. s.n.*, BISH 780226], 3–7 mm long, rachilla hairy, prolonged 2 mm beyond uppermost floret, sometimes with an aborted lemma at apex, often with purple pigmentation. Glumes subequal, 3–7 mm long, usually surpassing lemmas, keeled, keel smooth to antrorsely scabrous apically, lower glume 1-veined, upper glume 3-veined, persistent after lemmas fall. Lemmas thin, not keeled, 3–5 mm long, callus hairs to 1.5 mm long, 4-fid at apex (often appearing lacerate) with lobes from 0.2–0.6 mm deep, the lobes variable, ranging from approximately subequal to larger outer lobes double the length of inner lobes. Awn 6–9 mm long, arising at length of lemma, geniculate to nearly straight. Palea strongly 2-keeled, keels glabrous at base and scabrous at apex. Anthers 3, 1.6–1.8 mm long, yellow or purple. Caryopsis ovoid to fusiform, cylindrical, ca. 1.6 mm long, slightly rugose.

Dichanthium sericeum (R.Br.) A.Camus subsp. ***sericeum*** **Nomenclatural note**

The naturalized Hawaiian populations of *Dichanthium sericeum* are the nominate subspecies, as all specimens are perennial (Barkworth *et al.* 2003; Simon & Alfonso 2011).

Digitaria didactyla Willd. **New island record**

Digitaria didactyla is now naturalized on Oʻahu, where it was found growing at Hoʻomaluhia Botanical Garden in an area where it does not appear to be planted. One large colony was found about 15 m wide in a mowed, turfgrass area. *Digitaria didactyla* is now known to be naturalized on Kauaʻi, Oʻahu, and Hawaiʻi (Faccenda 2023).

Material examined. **OʻAHU**: Ho'omaluhia Botanical Garden, large grassy area between visitor center and lake, mowed, unirrigated grass area otherwise dominated by *Axonopus compressus*, 68 m, 21.387287, -157.807482, 27 Aug 2023, *K. Faccenda & S. Vanapruks 3227.*

Digitaria longiflora (Retz.) Pers. **Correction**

Digitaria longiflora was published as a new state record by Faccenda (2023); however, further examination of the specimen suggests that it is an aberrant *Digitaria violascens* with unusually pale fertile lemmas and a "stolon" that was actually a culm laying sideways and subsequently developing branches from the axillary nodes. Seed was taken from the original specimen and cultivated by the author, and despite having consistently brown fertile lemmas, the cultivated plant failed to produce stolons and grew inflorescences with up to 5 branches that were dramatically longer than the original specimen and out of the recorded range of *D. longiflora*. As this was the only specimen known, this species should be deleted from the naturalized flora.

Digitaria setigera Roth. var. ***setigera*** **Nomenclatural note**

All *Digitaria setigera* in Hawaiʻi are of the nominate variety, as they lack glassy bristles (Boonsuk *et al*. 2016).

Digitaria stricta Roth var. ***stricta*** **New island record**

Digitaria stricta is now known to be naturalized on Kauaʻi, where approximately 50 plants were found at the parking lot overlooking Wailua Falls. *Digitaria stricta* was previously known only from Oʻahu (Faccenda 2022).

Material examined. **KAUAʻI**: Wailua Falls lookout, sunny, moist area, found along roadside with other weeds, common, at least 50 plants seen, plants close to 1 m tall, culm bases purple, 71 m, 22.033559, -159.379141, 11 Sep 2023, *K. Faccenda & C. Statler 3229*.

Dissochondrus biflorus (Hillebr.)
Kuntze ex Hack. **Extirpation**

Dissochondrus biflorus is extirpated from Kauaʻi, Lānaʻi, and Hawaiʻi. On Kauaʻi it has not been seen since 1973 (*Herbst 2986*), despite concerted efforts made to relocate it (Ken Wood, pers. comm.). On Lānaʻi it has not been seen since Hillebrand's time. On Hawaiʻi it has not been seen since 1911 at Puʻu Waʻawaʻa, and PEPP knows of no populations (Josh VanDeMark, pers. comm.). Populations remain on Oʻahu, Molokaʻi, and Maui. Molecular evidence supports *Dissochondrus* being maintained as a valid monotypic genus whose closest known relative is *Pseudoraphis,* an Asian genus (Arthan *et al.* 2024).

Eragrostis variabilis (Gaudich.) Hook. & Arn. **Note**
[= *Eragrostis fosbergii* Whitney]

Eragrostis fosbergii, known only from the Waiʻanae Mountains, has been diagnosed by its ciliate glumes, but is otherwise indistinguishable from *E. variabilis* (O'Connor 1990). Maintaining this as a distinct species, amongst the many other names that have been synonymized into *E. variabilis* (O'Connor 1990), is not justified given the wide morphological variation in *E. variabilis.*

Hemarthria altissima (Poir.) Stapf & C.E.Hubb. **New island record**

Hemarthria altissima is now naturalized on roadsides on Hawaiʻi Island, where it has spread from pastures in Mountain View and Glenwood. It has previously only been reported as naturalized on Maui (Imada 2019).

Material examined. **HAWAIʻI:** Mountain View, N Peck Rd, near highway, weedy roadside, sunny, wet, edge of pasture, 2 patches seen along road, each about 5 m wide, sprawling grass to 1.5 m tall, 554 m, 19.540191, -155.128320, 06 Jan 2024, *K. Faccenda & E. Judziewicz 3278*; Puna Distr, N Glenwood Rd, roadside, wet, sunny area, decumbent grass, rare, only one colony seen along this road, about 5 m long along road, spreading from pasture but area not extensively surveyed, 822 m, 19.500946, -155.175656, 05 Jan 2024, *K. Faccenda & E. Judziewicz 3266*.

Hyparrhenia rufa (Nees) Stapf var. ***rufa*** **Nomenclatural note**

Following the treatment of *Hyparrhenia* in the monograph by Clayton (1969), the *Hyparrhenia rufa* populations naturalized in Hawaiʻi are recognized as the nominate variety, *H. rufa* var. *rufa*.

Koeleria glomerata Kunth **Nomenclatural note**

This endemic species, called *Trisetum glomeratum* (Kunth) Trin. ex Steud. in the *Manual* (O'Connor 1990), should now be recognized in the genus *Koeleria*, based on molecular evidence (Barberá *et al.* 2019; Barberá *et al.* 2025).

Koeleria inaequalis (Whitney) Barberá,
Quintanar, Soreng & P.M.Peterson **Nomenclatural note**

This endemic species, referred to as *Trisetum inaequale* Whitney in the *Manual* (O'Connor 1990), should now be recognized in the genus *Koeleria*, based on molecular evidence (Barberá *et al.* 2019; Barberá *et al.* 2025).

Koeleria macrantha (Ledeb.) Schult. **Correction**

Koeleria macrantha was first published as naturalized in Hawai‘i by O’Connor (1990; as *K. nitida*), based on about a dozen collections from Mauna Kea. In the generic key in O’Connor (1990), it is distinguished from the native *K. glomerata* [as *Trisetum glomeratum*] by its lack of awns, whereas *K. glomerata* is awned. However, this is the only trait in which the “*K. macrantha*” specimens differ from *K. glomerata*. Examination of all *K. glomerata* specimens found that material from Maui consistently has awns, but plants on Hawai‘i are variable and generally have smaller awns than plants from Maui. Some specimens annotated as *K. macrantha* were also found to have minute awns up to 4 mm long. The protologue of *K. glomerata* also describes the lemma as “sub apice breviter aristata, … arista recta, hispido-scabra, inflore secundo interdum, in tertio semper abortiens,” or “shortly awned below the apex, … awn straight, bristly-scaly, sometimes in the second flower, always abortive in the third,” and examination of photographs of original material of *K. glomerata* stored at K showed short awns on some lemmas and other lemmas lacking, or with minute, awns. The type locality is also from Mauna Kea.

The World Collection at BISH also has numerous vouchers of *K. macrantha* from its native range, which were compared to the Hawaiian material. These collections differ from Hawaiian “*K. macrantha*” in their softer, thinner leaves and glabrous to scabrous lemmas and glumes. The Hawaiian “*K. macrantha*” are identical to *K. glomerata* in all non-awn characters examined, including their stiffer, often in-rolled, wider leaves; longer pubescence on the inflorescence peduncle; and variably pubescent glumes and lemmas. Therefore, it is concluded that *Koeleria glomerata* is variable as to whether it has awns and that all identifications of *K. macrantha* in Hawai‘i derive from misidentifications of *K. glomerata*.

Melinis repens (Willd.) Zizka subsp. ***repens*** **Nomenclatural note**

All *Melinis repens* in Hawai‘i should be referred to as the nominate subspecies, following the taxonomy of Launert & Pope (1989) and examination of all specimens at BISH.

Microlaena stipoides (Labill.) R.Br.
var. ***stipoides*** **Nomenclatural note**

All Hawaiian plants of *Microlaena stipoides* are the nominate variety, following the taxonomy of Edgar & Connor (2000) and examination of all BISH specimens.

Oryza sativa L. **Correction**

Oryza sativa was published as questionably naturalized (Faccenda 2022) but should be excluded from the naturalized flora, as there is no evidence of natural reproduction.

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

Label data on three sheets of possible original material of *Panicum beecheyi* at E, K, and US all give the locality as “Oneehow,” expanding the historical range of this grass to Ni‘ihau, although it is now likely extirpated on that island.

Material examined. **NI‘IHAU:** n.d., *Beechey s.n. (*K 000674382*).*

Panicum miliaceum L. **Correction**

Previously reported on Kauaʻi, Oʻahu, Maui, and Hawaiʻi (O'Connor 1990; Oppenheimer 2003), all prior reports are associated with gardens or areas where bird seed was likely cast. No specimens document persistent populations. As such, these records should be considered adventive populations and excluded from the naturalized flora unless new evidence arrives to the contrary.

Paspalum plicatulum Michx. **New island record**

Paspalum plicatulum is now naturalized at Kualoa Ranch on Oʻahu. This new naturalization was located and identified through the citizen science platform iNaturalist (https://www.inaturalist.org/observations/206526634). Over 100 individuals were observed in 4 populations located within about 1 km of each other. These plants were found on ridge tops, fencelines, and the edge of a pasture.

Material examined. **Oʻahu:** Kaʻaʻawa Valley, NW side, grazing pasture slopes, 275 ft [85 m], 12 May 2025, *A. Evans KR9.*

Pentapogon micranthus (Cav.) P.M.Peterson, Romasch. & Soreng **Nomenclatural note, new island records**

Dichelachne micrantha should now be referred to as *Pentapogon micranthus* based on molecular evidence (Peterson *et al.* 2022a). *Pentapogon micranthus* is a non-native species that has been reported as naturalized on Kauaʻi, Lānaʻi, and Maui (Imada 2019). Collections made of this species in Kaunakakai and Hāmākua document its naturalization on Molokaʻi and Hawaiʻi. It should be considered extirpated on both islands until recollected.

Material examined. **Molokaʻi**: Kaunakakai, 02 May 1952, *E.Y. Hosaka 3659.* **Hawaiʻi:** Hāmākua, Honokaʻa, Pauhau, 04 Jul 1956, *E.Y. Hosaka 4011*.

Poa annua L. **Note**

At the Kaʻala summit along the road an unusual grass was located, covering hundreds of square meters along about 500 m of roadside, and was most common at the area surrounding the composting toilet. The species was quite delicate, stoloniferous, rooting at the nodes and forming thick mats and successfully competing with kikuyu (*Cenchrus clandestinus*). Notably, no flowers could be found despite extensive searching. Some of this grass was cultivated in a greenhouse. Over the two years the plant has been in cultivation, it produced one inflorescence (Mike Ross, pers. comm.).

Photos from this inflorescence were shared with Rob Soreng (US), who identified the plant as *Poa annua* and noted that *P. annua* may perennate in alpine conditions in tropical places. These perennial types of *P. annua* have been called *P. annua* var. *reptans* Hausskn. (Carson *et al.* 2007), although varieties of *P. annua* are not accepted in Soreng (1993). *Poa annua* is an allopolyploid derived from an annual caespitose species (*Poa infirma* Kunth) and a perennial, stoloniferous species (*Poa supina* Schrader; Mao & Huff 2012). It is the opinion of Soreng that stoloniferous forms of *P. annua* have evolved repeatedly, likely aided by its *P. supina* ancestry. Evolution *in situ* at Kaʻala is unlikely given the roadside habitat, and it seems more likely that this grass was introduced as an erosion control species, as cultivars resembling this plant are available commercially (Soreng 1993). Within *P. annua*, there are various flowering responses in different populations, with some requiring short days and others long days (Heide 2001), perhaps explaining why no flowers could be found in May 2021.

Material examined. **O‘AHU:** Pu‘u Ka‘ala summit, roadside, 1216 m, 21.507922, -158.143839, 06 May 2023, *K. Faccenda & T. Chambers 3100*; Kapi‘olani Community College greenhouse, cultivated material from *Faccenda 3100*, 01 Mar 2024, *M.C. Ross 1984.*

Rytidosperma biannulare (Zotov) Connor & Edgar **Note**

The identification of *Rytidosperma* in Hawai‘i has been immensely complicated by the great number of misapplied names used locally and their shifting application over time (Table 1). Unfortunately, names must now shift again after a much more careful review of Hawaiian specimens by Graeme Lorimer (MEL), which began with a conversation on iNaturalist.org. The taxonomy used here follows the treatment of *Rytidosperma* by Edgar & Connor (2000). There were 12 accessions of *Rytidosperma* imported by the Hawaii Agricultural Experiment Station (HAES) from 1913–1937, which were received as *Danthonia pilosa* or *D. semiannularis*, identifications that cannot be trusted. It is also possible that further seeds of *Rytidosperma* were imported accidentally with hay.

Rytidosperma biannulare has previously been published as occurring on Moloka‘i and Maui (Imada 2019) and this island-level distribution remains unchanged. However, within Maui both this species and *R. gracile* have been identified from BISH specimens formerly identified as *R. biannulare*. *Rytidosperma biannulare* is currently the only *Rytidosperma* known from West Maui. However, on East Maui it overlaps with *R. gracile*. See the key below for identification. How these species differ ecologically in Hawai‘i is not yet known.

Rytidosperma gracile (Hook.f.) Connor & Edgar **New state record**

Rytidosperma gracile, an Aotearoan and Australian species (POWO 2025), is naturalized on Haleakalā from 3000–8000 ft [900–2440 m]. It has been present on Maui since 1937 but has been referred to as *R. biannulare*, *R. caespitosum,* and *Danthonia semiannularis* throughout time (Table 1). See further discussion about misapplied names under *R. biannulare.* See the key below for identification. Only representative specimens are cited below.

Material examined: **MAUI:** Haleakalā, Pu‘u Nianiau, common in open pasture, 6000 ft [1830 m], 28 Jan 1937, *E.Y. Hosaka 1767*; Haleakalā, Makawao, in grassy slopes among *Styphelia*, 5000 ft [1520 m], 12 Apr 1947, *E.Y. Hosaka 2472*; Haleakalā National Park, Hosmer grove, 6800 ft [2070 m], 10 Nov 1993, *P. Welton 1786.*

Rytidosperma penicillatum (Labill.) Connor & Edgar **Note**

This species was formerly treated as the only *Rytidosperma* naturalized in Hawai‘i with upper lemma hairs in tufts (Imada 2019). This has now been split into three species (Table 1). *Rytidosperma penicillatum* in its revised sense is widespread above 4000 ft [1220 m] on East Maui and western and northern Mauna Kea. The oldest specimen of *R. penicillatum* from Maui is a volunteer in a grass garden (BISH 448988) from 1938, although it is possible that this species was also accidentally introduced as a hay contaminant earlier, as it was “common in [a] pasture” in 1944 (*Hosaka 2675*).

Material examined. **MAUI:** East Maui, Kahikinui, Pāhihi drainage, 4800 ft [1460 m], 27 Sep 2006, *H. Oppenheimer H90623*; Makawao, ‘Ōma‘opio, 5000 ft [1520 m], 11 May 1944, *E.Y. Hosaka 2675*; East Maui, Crater Rd, pasture, 5500 ft [1680 m], 13 Sep 2000, *F. Starr & K. Martz 000913-3*; East Maui, Haleakalā National Park, old switchbacks [near modern Halemau‘u trail], 7850 ft [2390 m], 13 Aug 2004, *F. Starr & K. Starr 040813-2*; Hosmer Grove LZ, 6800 ft [2070 m], 13 Jun 2002, *P. Welton & B. Haus 2157*. **HAWAI‘I:** Mauna Kea, Hāmākua, Ka‘ohe, occasional in dry open pasture, 6500 ft [1980 m], 12 Sep 1936, *E.Y. Hosaka 1596*; Hāmākua, Kalōpā, Hanipoe, semi-dry pasture, rare, 5500 ft [1680 m], 03 Jul 1952, *E.Y. Hosaka 3667*; Mauna Kea, Pu‘u Lā‘au hunter’s cabin, 7500 ft [2290 m], 18 Jan 1975, *D.R. Herbst 2554*.

Table 1. Usage of different *Rytidosperma* names in Hawai‘i by different authors and the islands they were reported from Moloka‘i, Maui, and Hawai‘i Each row corresponds to one species, cells spanning multiple rows indicate one name was used for what is now recognized as multiple species. (Mo = Moloka‘i, M = Maui, H = Hawai‘i).

This paper	Faccenda (2022, 2025)	Darbyshire *et al.* (2010); Imada (2019)	O’Connor (1990); Whitney *et al.* (1939)
Rytidosperma penicillatum (M, H)	*Rytidosperma penicillatum* (M, H)	*Rytidosperma penicillatum* (M, H)	*Danthonia pilosa* (H)
Rytidosperma racemosum var. *racemosum* (M, H)			
Rytidosperma pilosum (H)			
Rytidosperma biannulare (Mo, M)	*Rytidosperma biannulare* (Mo, M)	*Rytidosperma biannulare* (Mo, M)	*Danthonia semiannularis* (M)
Rytidosperma gracile (M)		*Rytidosperma caespitosum* (M)	

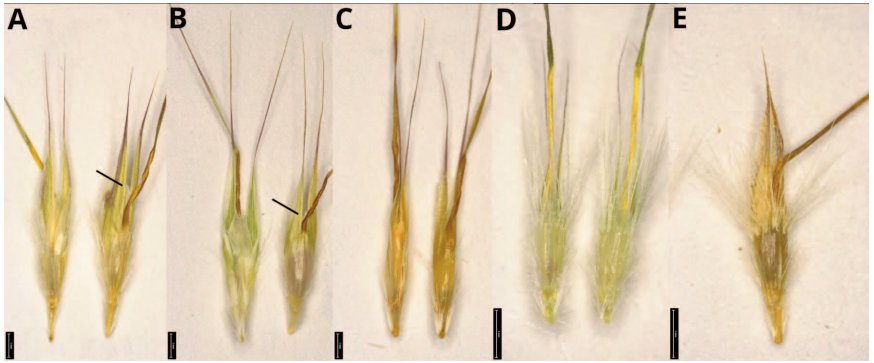

Figure 1. Lemmas of *Rytidosperma* spp. **A,** *R. racemosum* var. *racemosum* (*Herbst 5937*), line indicates tip of palea. **B,** *R. penicillatum* (*Welton 2157*), line indicates tip of palea. **C,** *R. pilosum* (*Hosaka 2316*). **D,** *R. biannulare* (*Oppenheimer H50725*). **E,** *R. gracile*, (*Hosaka 1767*).

Rytidosperma pilosum (R.Br.) Connor & Edgar **New state record**

This species was formerly treated as the only *Rytidosperma* naturalized in Hawai‘i with upper lemma hairs in tufts before the work by Darbyshire *et al*. (2010) changed it to *R. penicillatum* (Table 1). A re-evaluation of Hawaiian specimens found *R. pilosum* does occur here and appears to be largely confined to the Humu‘ula area, where it co-occurs with *R. racemosum* var. *racemosum*.

Material examined. **HAWAI‘I:** Humu‘ula, near Pu‘u ‘Ō‘ō, 7000 ft [2130 m], 02 May 1932, *G.R. Ewart III 250*; Saddle Rd, 26 miles from Hilo, 6000 ft [1830 m], 29 Mar 1967, *D.R. Herbst 404*; Saddle area, common along road to Mauna Loa observatory, 7000 ft [2130 m], 15 Jun 1981, *J. Davis 523*; Ahumoa, 6900 ft [2100 m], 21 May 1975, *D.R. Herbst 5341*.

Rytidosperma racemosum (R.Br.)
Connor & Edgar var. ***racemosum*** **New state record**

Most of the specimens previously called *Rytidosperma penicillatum* have now been reidentified as *R. racemosum* var. *racemosum*. Photos of these plants on iNaturalist were reviewed by Graeme Lorimer (MEL), who identified them by their lemmas being widest above the uppermost hairs, the length of the callus hairs, and the relatively longer callus. Examination of specimens at BISH confirms this determination on the basis of the key in Edgar & Connor (2000) and Darbyshire *et al.* (2010). This species is naturalized on Maui and Hawai‘i and is known from western Haleakalā, widespread on Mauna Kea, and currently the only *Rytidosperma* known from Mauna Loa. In its native range of Australia, this species is tolerant of disturbance and compacted soil. Lorimer (pers. comm.) reports that it is found in lawn, pastures, and paths, in addition to less disturbed sites.

Material examined: **MAUI:** East Maui, Kama‘ole, Kula Forest Reserve, 6300 ft [1920 m], 15 Jul 2002, *H. Oppenheimer H70208*; Haleakalā Crater, Halemau‘u Trail, 7000 ft [2130 m], 28 Jun 1992, *P. Welton 1658*. **HAWAI‘I:** Hawai‘i Volcanoes National Park, Mauna Loa Strip Rd, 1878 m, 19.483598, -155.377854, 15 Aug 2022, *K. Faccenda & J. Gross 2653*; Halepōhaku, 9200 ft [2800 m], 06 Oct 1981, *L.W. Cuddihy 895*; Pōhakuloa Military Camp, Mauna Kea, 1979 burn, 8000 ft [2440 m], n.d. [1980s], *K. Adee s.n.* (BISH 580767); N slope of Mauna Kea, makai of Pu‘u Kole near Hanaipoe Gulch, widespread and common, 2650 m, 23 Jun 2004, *F. Starr & K. Starr 040723-9*.

KEY TO *RYTIDOSPERMA* NATURALIZED IN HAWAIʻI

Examining lemmas under magnification is necessary for identification. The awn column is the strongly coiled, basal portion of the awn and is usually browner and shinier than the upper portion of the awn. The column is best examined on mature lemmas, as its length will contract as it coils with age. The awn sinus is cleft in the lemma at the base of the awn. To determine branching, examine the base of the plant where new culms arise at the base of the old culms (tillering). Extravaginal branching occurs when the new culm pierces through the old, often at a wide angle. Intravaginal branching occurs when a new culm arises within the sheath of an old culm at a narrow angle, pushing the old sheath out of the way without piercing through it.

1. Lemma with 2 continuous rows of hairs; lemma surface sparsely short-hairy between rows; inflorescence paniculate
    2. Awn column equalling upper lemma hairs, surpassing palea; branching intravaginal; leaves mostly basal, often forming a dense tuft ..... *R. biannulare*
    2′. Awn column shorter than upper lemma hairs, equalling or less than palea; branching extravaginal; leaves mostly cauline, usually not forming a dense tuft .....*R. gracile*

1′. Lemma with 1 lower continuous row of hairs, upper hairs concentrated in 2 lateral tufts, sometimes with scattered hairs between upper tufts; lemma glabrous between rows; inflorescence racemose or paniculate
    3. Palea barely reaching or equalling the awn sinus; branching intravaginal .... *R. pilosum*
    3′. Palea surpassing the base of the awn sinus (Figure 1A, B); branching extravaginal
        4. Lemma widest above uppermost tuft of hairs; callus hairs shorter than or barely reaching lower lemma hairs ..... *R. racemosum* var. *racemosum*
        4′. Lemma widest at uppermost tuft of hairs; callus hairs reaching or surpassing lower lemma hairs ..... *R. penicillatum*

Saccharum spontaneum L. subsp. ***spontaneum*** **Correction; nomenclatural note**
There is no longer any evidence that this species is naturalized on Molokaʻi, as the only evidence of naturalization was a misidentified specimen of *Saccharum officinale* L. (*St. John 19960*) published by O'Connor (1990). Furthermore, all *S. spontaneum* in Hawaiʻi should be referred to as the nominate subspecies on the basis of the leaf blade narrowing to nearly just the midvein at the base, and the triangular ligules (Cope 2002).

Sorghum bicolor (L.) Moench subsp. ***bicolor*** **Correction; nomenclatural note**
Plants previously referred to as *Sorghum bicolor* (L.) Moench in Hawaiʻi should now be referred to as *S. bicolor* subsp. *bicolor*, following the species concept proposed by De Wet (1978). This species concept better represents the biology of these plants, as *S. bicolo*r subsp. *bicolor* is a cultigen derived from wild *S. bicolor* subsp. *verticilliflorum* (Steud.) de Wet and the two subspecies freely hybridize to form *S. bicolor* nothosubsp. *drummondii*. Previously published as naturalized on Kauaʻi, Oʻahu, Maui, and Hawaiʻi (Imada 2019), *S. bicolor* subsp. *bicolor* should now be recognized as a casual in Hawaiʻi, as there is no evidence self-sustaining populations exist here. Bird seed appears to be the main source of the plants found here, as most plants are found in urban areas where seed is often scattered.

Sorghum bicolor nothosubsp. ***drummondii***
(Nees ex Steud.) de Wet ex Davidse **Nomenclatural note**
Plants previously known as *Sorghum drummondii* (Nees ex Steud.) Millsp. & Chase in Hawai‘i should now be called *S. bicolor* nothosubsp. *drummondii* per De Wet (1978). See additional comments above.

Figure 2. *Stolonochloa pygmea* forming a dense ground cover outside the ‘Ōla‘a small tract.

Stolonochloa pygmaea (R.Br.) E.J.Thomps. **Nomenclatural note; note**
Panicum pygmaeum R. Br. was published as occurring in Hawai‘i by Faccenda (2023) but has now been moved to the genus *Stolonochloa* as *S. pygmaea* (R.Br.) E.J.Thomps. (Thompson 2022) as a part of an ongoing effort to make the genus *Panicum* monophyletic. The author visited the population initially found by Linda Pratt and found it to have persisted. Only this one population is known in Hawai‘i, despite rather extensive bike surveys of Volcano in both subdivisions on either side of the highway.

It is very curious how this grass native to eastern Australia arrived in Hawai‘i. It is endemic to Queensland and New South Wales, where it occurs in tropical heaths, tropical and subtropical sclerophyll forests, and tropical and subtropical subhumid woodlands (Simon & Alfonso 2011). The population in Volcano is growing along a fenceline surrounding the ‘Ōla‘a Small Tract of the Hawai‘i Volcanoes National Park, where it was found in the wet understory of a closed canopy rainforest along 180 m of fence. It is spreading stoloniferously into the native-dominated ‘ōhi‘a forest, forming mats on the ground (Figure 2). However, it is more common outside the fence, where it is benefited

by pig disturbances. It was not seen along the sunnier part of the fence that borders a pasture, nor was it seen inside the fully sunny, kikuyu-dominated pasture. This may be due to its reliance on shade, or because the area had been sprayed with herbicide before the site was visited. Perhaps this population arrived with fence materials or via a potted plant and has since spread to the fenceline from a residence in Volcano.

Material examined. **HAWAI‘I:** Volcano, ‘Ōla‘a Small Tract (end of Haunani Rd), along fenceline, 1168 m, 19.452751, -155.245333, 05 Jan 2024, *K. Faccenda & E. Judziewicz 3267*.

Triraphis mollis R.Br. **New naturalization**

An unusual grass was posted on the citizen science website iNaturalist by Michael Sthreshley (https://www.inaturalist.org/observations/222182319), and a specimen was requested and identified as *Triraphis mollis*. A single plant was found in leeward Kohala in an area consisting predominantly of buffelgrass and struggling kiawe trees. The plant appeared after irrigation was enabled in the area. It is likely that more plants exist upslope from where this was found, as leeward Kohala has been poorly studied botanically, and this is very likely naturalized despite only one plant being seen.

Triraphis mollis was imported as a forage species in the mid-twentieth century (Faccenda 2025) and has likely been naturalized ever since. *Triraphis mollis* is native to Australia, where it is widespread across inland arid areas, often found in clayey sand soils or red earth soils (Simon & Alfonso 2011). It has since been reported as naturalized in Belgium, Germany, Great Britain, New Guinea, and Texas (POWO 2025). This species is grazed, but is generally not well regarded as a forage grass as it contains cyanide, but poisoning is rarely reported in Australia due to the species' low density (Simon & Alfonso 2011).

This species can be identified by its tussocky perennial habit, feathery purple flower heads at maturity, and many awns. Look-alike species may be *Aristida adscensionis* L. or *Festuca myuros* L., but these are smaller annuals.

Material examined. **HAWAI‘I:** Kohala, site of former ornamental nursery, single individual in irrigated plot that was formerly a small nursery site, 95 m, 20.129563, -155.882375, 13 Jun 2024, *M. Sthreshley 2*.

Triticum aestivum L. **Correction**

Previously published as naturalized on Kaua‘i, O‘ahu, Moloka‘i, Lāna‘i, Maui, and Hawai‘i by Wagner & Herbst (2003), who called it "clearly naturalized," the same conclusion has been unable to be reached by the author. No naturalized populations were found during extensive fieldwork (see Faccenda 2023), and the majority of herbarium material is from areas where seed was likely spilled or dumped. Furthermore, no specimens from Hawai‘i are explicitly described as naturalized by their collectors. As such, *Triticum aestivum* should be considered a casual species in Hawai‘i and excluded from the naturalized flora.

Urochloa maxima (Jacq.) R.D.Webster **Nomenclatural note**

Guinea grass, formerly placed in both the genera *Panicum* and *Megathyrsus*, is most accurately referred to as *Urochloa maxima*, as molecular evidence has consistently shown the genus *Megathyrsus* is entirely nested within *Urochloa* (González & Morton 2005; Tomaszewska *et al*. 2023; Masters *et al.* 2024).

Urochloa mollis (Sw.) Morrone & Zuloaga **Retraction of naturalization**
Initially reported from one specimen from Makapu‘u collected in 1997 (Staples *et al.* 2002), *Urochloa mollis* has not been seen since. The Ka‘iwi and Makapu‘u areas were specifically searched for this species in the winter of 2023 and was not found. *Urochloa mollis* should therefore be considered a questionable naturalization in Hawai‘i unless it is relocated.

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