Plants of Kure Atoll Identification Guide

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Introduction

This document presents detailed information on the field identification of native and nonnative plants on Kure Atoll. The intent of the guide is to serve as an instructional tool for field technicians working on plant management projects on Kure. The guide covers 42 species of vascular plants currently found on the atoll including both non-native plants that are the target of control or eradication efforts, and native plants from which these nonnative plants must be distinguished.

In general, plants are most difficult to definitively identify when they are young. For practical purposes you will generally not need to be able to identify plants as sprouts. I have attempted to document these plants through all stages of their life cycle mostly to satisfy my own curiosity as to whether or not I could identify them at such an early age. For the general reader it is sufficient to focus on discriminating plants at larger sizes.

Finally, it is important to recognize the high degree of variability within a single species of plant. Color, texture, size, and other characteristics depend on conditions. An attempt was made to present photographs that demonstrate this variability but it should be kept in mind that odd forms of plants will probably be encountered in the field, and that distinctions of leaf color, shape, and size are often not definitive.

Background

In this document an attempt was made to document plant development from cotyledon to maturity. Cotyledons are energy storage organs that function as the first "seed leaves" of a seedling plant. Angiosperms, or flowering plants, have been traditionally divided into two clades, the monocots and dicots, the names deriving from the fact that the first group produces a single cotyledon, the second, two cotyledons. Dicots are no longer considered monophyletic, but for the purposes of this document it is sufficient to note that on Kure the grasses (monocots) produce one cotyledon, the rest of the vascular plants (dicots) produce two.

Cotyledons are often quite different from the true leaves in gross morphology. Most, but not all of the plants covered in this document include photos of the cotyledons. It is generally not necessary to be able to distinguish plants at this young age; in fact you are unlikely to see many of these plants as cotyledons. I undertook the creation of this document after embarking upon the absurd quest to teach myself to identify all of these plants as cotyledons. Feel free to focus on field marks at more practical stages of plant development.

A Casio watch buckle is in many of the photographs for scale. The buckle is 18 mm wide and the letters are about 2 mm tall.

Organization

Starr and Martz (2001) identified 81 species records for Kure Atoll. Since then there have been 4 intentional introductions (*Cordia subcordata, Cyperus laevigatus, Cyperus polystachyos, Sesuvium portulacastrum*) and one unintentional introduction (*Dactyloctenium aegyptium*), for a total of 86 species. Five native species and 29 non-native species have gone extinct due to outcompetition, were only observed as seeds (e.g. seabeans), were removed, or were eradicated. The lone Ironwood tree (*Casuarina equisetifolia*) is sterile and is not covered here. The first three of four intentional introductions are now also being controlled or removed and exist as a few localized individuals. Several other species either were not observed in the winter of 2013 or are difficult to discriminate (i.e. Euphorbia sp.). Plants that have been documented on Kure but not covered are listed below.

Casuarina equisetifolia Cyperus laevigatus Cyperus polystachyos Cordia subcordata Euphorbia hirta Euphorbia hypericifolia Amaranthus spinosus Boerhavia coccinea Conyza bonariensis

Plants Covered in this Guide (in alphabetical order by genus within clades) Native plants are in **bold**

Dicots

Amaranthus viridis Anagallis arvensis **Boerhavia** repens Cassytha filiformis *Chenopodium murale Ciclospermum* leptophyllum *Coronopus didymus* Euphorbia maculata Euphorbia peplus Flaveria trinervia *Heliotropium foertherianum* Ipomoea indica *Ipomoea pes-caprae Lepidium virginicum* Lobularia maritima Oenothera laciniata Oxalis corniculata Portulaca oleracea *Pseudognaphalium sandwicensium var. sandwicensium*

Scaevola taccada Sesuvium portulacastrum Sicyos maximowiczii Solanum americanum Solanum nelsonii Sonchus oleraceus Spergularia marina Stellaria media Tribulus cistoides Verbesina encelioides

Monocots

Cenchrus echinatus Cynodon dactylon Cyperus rotundus Dactyloctenium aegyptium Eleusine indica Eragrostis amabilis **Eragrostis paupera Eragrostis variabilis Fimbristylis cymosa Lepturus repens** Poa annua Polypogon interruptus Setaria verticillata Sporobolus pyramidatus

The Dicots: Practical Aspects of Plant Identification

Most of your time on Kure will likely be spent searching for and killing Verbesina. For the most part Verbesina is easy to identify. When Verbesina is very small it is very similar to Lobularia, and it is probably worth your time to study the cotyledons of these two species. In addition to being able to recognize Verbesina, you should have a general knowledge of the other non-native plants on Kure. Many of the non-native plants are uncommon, restricted in distribution, or seasonal. The best way to learn your plants is by seeing them in the field. Take the time to ask where these uncommon plants are found so that you can observe the variety within the species. Many of them are found in camp. Since many of these plants are entirely or somewhat seasonal they are unlikely to be observed during some part of the year. All of the seasonal plants include a description of the typical period during which they occur, but these dates should be taken as approximate, and out of season germination is always possible.

Amaranthus viridis

Slender Amaranth

Amaranthus viridis is one of two non-native Amaranthus species traditionally found on Kure. A. spinosus is either gone or is very rare. A. viridis is one of the few broad leafed nonnative shrubs that does not have dentate (toothed) margins (leaf edges). The leaves are somewhat triangulate to diamond shaped (technically deltate-ovate to narrowly rhombic) and have a distinct central nerve. Amaranthus viridis is found in camp but is rare.



Figure 1: Amaranthus viridis

Figure 2: Amaranthus viridis

Amaranthus cotyledons most closely resemble those of Chenopodium (below left). Both are linear to lanceolate (lance shaped), widest about 1/3rd of the distance from the base to the

tip, and rounded at the tip. The true leaves are distinctive at a young age, Chenopodium with dentate (toothed) margins, Amaranthus (below right) with entire (not dentate) margins. Amaranthus is found only infrequently but this may be because it is overlooked. The two common sites for it are near the sea grape tree south of the main building, and in the area to the east of the trail from the main building to the cistern and south of the cistern.





Description: Monoecious annual herb stems erect or occasionally ascending, 1-8 (-10) dm long, sparingly to densely branched, striate, glabrous and usually becoming pubescent with multicellular hairs above. Leaves deltate-ovate to narrowly rhombic, blades 2-7 cm long, 1.5-5.5 cm wide, Amaranthus viridis (PIER species info)

http://www.hear.org/pier/species/amaranthus_viridis.htm. Glabrous or lower surface pilose along the veins, apex usually narrow and with a small narrow emargination, petioles 1-10 cm long. Flowers green, in slender, axillary or terminal and often paniculate spikes, sometimes in axillary clusters in lower part of plant, both sexes mixed throughout the spikes, but pistillate flowers more numerous, bracts and bracteoles whitish, deltate-ovate to broadly lanceolate, membranous, with a short, pale or reddish awn; sepals 3 (4), those of staminate flowers ovate-oblong, ca. 1.5 mm long, apex acute, mucronate, those of pistillate flowers narrowly spatulate to oblong, 1.3-1.8 mm long, apex more or less mucronate; stigmas 2-3. Fruit subglobose, 1.3-1.5 mm long, not or only slightly exceeding the sepals, indehiscent or rupturing irregularly at maturity, conspicuously rugose throughout. Seeds dark brown to black, more or less shiny, slightly compressed, 1-1.3 mm long, reticulate and with shallow outgrowths on the reticulum (Wagner *et al.*, 1999; p. 189).

Anagallis arvensis

Scarlet Pimpernel

Anagallis is a diminutive non-native plant with colorful scarlet flowers. The leaf shape and growth form are distinctive and make Anagallis relatively easy to identify. Old plants branch and spread almost as vines. It is found in camp, east turnaround, and west turnaround and is somewhat seasonal, being more abundant in winter.



Figure 5: Anagallis arvensis

Figure 6: Anagallis arvensis

Anagallis cotyledons are cuneate, or wedge shaped, with rounded tips. They share this shape with Oenothera but are sessile (lacking a stem) and smaller, which distinguishes them from Oenothera.



Figure 7: Anagallis arvensis

Figure 8: Anagallis arvensis

The true leaves, when young, are sometimes almost perfectly heart-shaped, more generally ovate (oval) to elliptic (elliptical with rounded ends), and glabrous (lacking hairs). The leaves are sessile, that is they lack a stem, which gives them their distinctive, crowded appearance. Look for them southeast of the porch of the main building, in the clearing behind the bunkhouse, and in west turnaround.



Figure 9: Anagallis arvensis

Figure 10: Anagallis arvensis

Description: Annual, biennial or short-lived perennial herbs; stems quadrangular, prostrate or decumbent, often rooting at the nodes, 1-6 (-9) dm long, forming compact mats. Leaves opposite or rarely whorled, ovate to elliptic or lanceolate, 8-20 (-25) mm long, 4-14 (-18) mm wide, glabrous, apex acute, base rounded, truncate, or subcordate, sessile and somewhat clasping the stem. Flowers on slender pedicels 5-40 mm long, recurved in fruit; sepals lanceolate, 3-5 mm long, margins scarious toward base; corolla salmon, sometimes blue or various paler colors, the lobes 4-5 (-10) mm long, minutely ciliate toward apex; staminal filaments hirsute with pale bluish hairs. Capsules papery, 4-6 mm in diameter, circumscissile, the style persistent. Seeds dark brown, ca. 0.8 mm long, minutely pitted (Wagner *et al., 1999; p. 1077).*

Boerhavia repens

'Alena

Boerhavia repens, a native plant, is a creeping vine, generally easy to distinguish from other plants on Kure. At a young age the leaf shape and size are somewhat similar to Flaveria and can catch your eye while spraying. The branching nerve pattern on Boerhavia readily distinguishes it from the 3-nerved pattern found on Flaveria. The congener, B. coccinea, used to be common in camp. It is non-native and was aggressively treated and is now either rare or gone. It can be difficult to distinguish from B. repens before flowering. B. repens has pinkish flowers, B. coccinea flowers are dark red or magenta.



Figure 11: Boerhavia repens

Figure 12: Boerhavia repens

Boerhavia cotyledons lack nerves, and the leaves are kidney shaped (especially when very new) to round. At this stage leaf size is generally asymmetric. The first true leaf, seen in the photo below, shows the branched nerve pattern that distinguishes Boerhavia from Flaveria.



Figure 13: Boerhavia repens

Cassytha filiformis

Kauna'oa Pehu

Cassytha is a non-native parasitic vine that was first observed on Kure in 2001. It can parasitize most plants found on Kure, and generally kills the host. It thrives in Scaevola taccada (Naupaka) and has devastated about 35 acres of the North and East sides of the island as of 2013.



Figure 14: Cassytha filiformis growing on Scaevola taccada

C. filiformis is a vine-like, autoparasitic and plant-hyperparasitic phanerogam (seed-bearing plant) in the plant family Lauraceae.

Cassytha produces large round seeds. These are often spread by shorebirds, which eat the fruit, but more commonly fall where they are produced. Seedlings sprout as a thick tendril that grows in search of a host. They can grow as long as a few meters on the energy stored in the seed.



Figure 15: Cassytha filiformis seed

Figure 16: Cassytha filiformis sprout

Cassytha extracts nutrients from the host plant by means of specialized structures, known as haustoria, that appear as small suckers or feet where the vine contacts the host. Cassytha can also grow from small sections of vine that are cut or broken from the parent plant. Care should be taken when building and maintaining Cassytha buffers to insure that no plant material is on or transferred to the 'clean' side of the buffer.



Figure 17: Cassytha filiformis parasitizing young grasses

Figure 18: Cassytha filiformis haustoria on Naupaka branch

Chenopodium murale

Goosefoot

Chenopodium murale, a non-native plant, is named for the shape of the leaf, which apparently resembles the shape of the foot of a goose. It also resembles Verbesina but the leaf margins have less regular dentition (teeth) and lack the fine hairs found on the upper surface of Verbesina. The largest Chenopodium murale leaves are also much smaller than most Verbesina leaves.



Figure 19: Chenopodium murale

Chenopodium cotyledons are linear to lanceolate (lance shaped) and broadest near the base. The first true leaves readily show the dentition (teeth) of mature Chenopodium leaves.



Figure 20: Chenopodium murale



Figure 21: Chenopodium murale

Chenopodium (below left), Ciclospermum (middle), and Amaranthus (right) all have long narrow cotyledons. Ciclospermum at this stage have an obvious raised central vein. Chenopodium and Amaranthus are difficult to discriminate until the first true leaves erupt, at which point the dentate (toothed) margins of Chenopodium are obvious.



Figure 22: Chenopodium murale

Figure 23: Ciclospermum leptophyllum

Description: Annual herbs; stems erect or ascending, 3-10 dm long, usually manybranched, mealy pubescent especially on young parts, rarely densely so. Leaves variable, usually rhombic-ovate, 1.5-9 cm long, 0.8-5 (-7) cm wide, mealy pubescent at least on lower surface, margins with 5-15 coarse, more or less irregular, ascending teeth on each side. Flowers in small, dense glomerules grouped into leafy, terminal and axillary, divaricately branched cymes up to ca. 5 cm long; calyx ca. 1 mm long, not completely enclosing the fruit at maturity, papillose and with a raised keel toward apex. Seed black, not especially shiny, horizontal, 1.2-1.5 mm in diameter, acutely keeled, the surface under high magnification marked with minute rounded pits." (Wagner *et al., 1999; p. 538).*

Ciclospermum leptophyllum

Fir-leaved Celery

Ciclospermum is a non-native plant that generally resembles celery, with long stalks crowned by heavily branched opposite leaves. It is found mostly in camp and nearby RAs and in the west turnaround. It is somewhat seasonal, usually occurring between October and May.



Figure 25: Ciclospermum leptophyllum

Ciclospermum cotyledons are linear to lanceolate, widening to a maximum width about halfway between the base of the stem and the tip. A central nerve is visible on these leaves as a slightly raised line. Subsequent leaves are highly dissected, often lobed and branched roughly in patterns of 3, and also bear a faint raised nerve along the centerlines. The stalk is generally long, reddish, and has the classic shape that we associate with edible celery. The cotyledons are neither large nor persistent so you are unlikely to see them without some effort.



Figure 26: Ciclospermum leptophyllum

Ciclospermum sprouts often emerge from the substrate with the cotyledons below the surface, thus immediately showing the characteristic palmate lobed leaf pattern. Though it superficially resembles Coronopus, it can be readily distinguished based on color, branching pattern, and long stem. The early non-branching leaves on Coronopus are also

much more likely to be visible, and differ from Ciclospermum in being widest near the well rounded tip.



Figure 27: Ciclospermum leptophyllum

Figure 28: Coronopus didymus

Description: Plants slender, 0.5-6 dm tall. Leaves pinnately decompound, the ultimate divisions filiform, oblong-ovate to orbicular in outline, 3.5-10 cm wide. Rays 1-5, 0.4-2.5 cm long; petals white or greenish white. Fruit orbicular to ovoid, 1.2-3 mm in diameter, mericarps readily separating.(Wagner *et al., 1999; p. 201)*

Coronopus didymus

Lesser Swinecress

Coronopus is a small, fast growing, and fast maturing, non-native plant. It takes advantage of disturbed areas and often grows quickly to maturity hidden by a larger plant. As such it requires great diligence to treat effectively. Infested areas usually have to be mostly devoid of other vegetation for Coronopus to be detected prior to seeding. The heavily lobed leaf shape of Coronopus is unique on Kure, making it relatively easy to identify. Coronopus also has a very strong and distinctive odor. If you learn its smell you can sometimes discover infestations by nose! Coronopus is somewhat seasonal, most abundant in the winter but occurring year round in some areas.



Figure 29: Coronopus didymus

Coronopus cotyledons (left) are very long and slender, widening gradually from the base to a rounded tip. They can be distinguished from Chenopodium (right), Amaranthus, and Ciclospermum, which have a wide base and narrow towards the tip.



Figure 30: Coronopus didymus



Figure 31: Chenopodium murale

The first true leaves of Coronopus are rounder and may begin to show dentate (toothed) margins. In the photo below left both of the smaller leaves have a single subtle tooth. After the 4-leaf stage the characteristic toothed leaf structure is apparent.



Figure 32: Coronopus didymus

Figure 33: Coronopus didymus

Coronopus seeds come packaged in woody corrugated shells that hinge open much like a clam. At more than a millimeter in diameter they are actually relatively large for the size of the plant. If you dig in Coronopus infested areas these seeds can be found in horrifying numbers.



Figure 34: Coronopus didymus sprout

Figure 35: Hinged shell and inner seed of Coronopus didymus

Figure 36: Coronopus didymus seed capsule (silicle)

Description: Foetid annual or biennial with short-loved rosette and procumbent to ascending glabrous or sparsely hairy stems to 40 cm long. Leaves 1-2-pinnatifid, narrow-oblong to ovate, glabrous except for sparse spreading hairs on petioles of some basal Plants of Kure Atoll Identification Guide

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leaves; rosette leaves petiolate, 6-10 x 1.5-2 cm; stem leaves smaller, usually pinnatifid, rarely 2-pinnatifid, 1-4 x 0.5-1.5 cm. Racemes (1)-3-5 cm; rachis with sparse spreading hairs; pedicels spreading, 2.5-4 mm long. Sepals c. 0.5 mm long. Petals white, less than sepals or 0. Stamens usually 2, rarely 4. Silicle broader than long, emarginate, c. 1.5 x 2-2.5 mm; valves finely warty or ridged, separating at maturity; stigma minute, almost sessile in apical notch of silicle. Seed comma-shaped, light brown, c. 1 mm long. (Webb *et al., 1988; p. 419*)

Euphorbia maculata

Spurge

There are several Euphorbia species found on Kure, all non-native. E. maculata is distinctive due to the red center found on the leaves. Otherwise these species are fairly difficult to separate. Most are easily identifiable as Euphorbia based on leaf size, shape, and branching pattern, which is very similar in at least two other species.



Figure 37: Euphorbia maculata

Young E. maculata leaves lack the red central spot. There may be variation in leaf shape and color as the plant matures depending on growing conditions. They are readily identified as Euphorbia based on the pinkish to red stem.



Figure 38: Euphorbia maculata

Figure 39: Euphorbia maculata

Euphorbia cotyledons are generally ovate, usually dark green but often tinged with, or rimmed with purplish-red. The stems are also red or purple. The true leaves are lighter, usually pink to purple, but darken to green as they grow. Though the cotyledons bear a passing resemblance to Portulaca cotyledons, Portulaca are sessile (lacking a stem) and typically narrower.

By a fairly young age the red stem and crowded opposite leaves are distinctive. Euphorbia maculata often grows to a substantial size (and maturity) underneath other vegetation, making them fairly hard to treat.



Figure 40: Euphorbia maculata

Figure 41: Euphorbia maculata

Description: Low annual herbs; stems usually prostrate or decumbent, 0.1-0.2 m long, shaggy villous or sometimes glabrate. Leaves elliptic-ovate or oblong-ovate to linear-oblong, 4-17 mm long, 2-5 mm wide, sparsely villous, upper surface often glabrate, margins Plants of Kure Atoll Identification Guide 22

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serrulate, apex various, base truncate, petioles 1-1.5 mm long, stipules deltate, 1-1.5 mm long, usually 2-3-parted, villous. Cyathia solitary at nodes of short, congested, leafy, lateral shoots; involucre ca. 0.8 mm high, villous, glands 4, oblong, minute, appendages short, white, margins irregularly crenate; staminate flowers 2-5 per cyathium. Capsules ovoid, 3-angled, 1.2-1.4 mm long, uniformly strigose. Seeds pale brown with a white coat, oblong, 4-angled, ca. 1 mm long, the faces with nearly regular, low, transverse ridges that sometimes slightly include the angles (Wagner *et al., 1999; p. 610-611).*

Euphorbia peplus

Petty Spurge

Euphorbia peplus is a non-native plant restricted to the vicinity of Camp and Mea RAs. It has reddish ascending stems and crowded elliptic leaves. E. peplus is seasonal, first



appearing in the last months of the calendar year.

Figure 42: Euphorbia peplus

E. peplus cotyledons are ovate and fairly similar to Lobularia. They average a little more long and slender than Lobularia but there is plenty of overlap. The true leaves, roughly elliptic, usually grow in curled or cupped along the central axis, but flatten as they grow out.



Figure 43: Euphorbia peplus

Figure 44: Euphorbia peplus

E. peplus leaves are usually light green to greenish yellow. The stems are thick and usually red on the basal part. The photo below left shows the characteristic curling of the newest leaves.



Figure 45: Euphorbia peplus



Figure 46: Euphorbia peplus

The veins in E. peplus leaves are very faint, but sometimes appear as a dark green pattern on a lighter yellow background. The flowers are tiny and lack petals, so they are very easy to overlook.



Figure 47: Euphorbia peplus



Figure 48: Euphorbia peplus

Euphorbia sp.

Spurge

Four or more species of Euphorbia, all non-native, have been found on Kure including E. peplus, E. maculata, E. hypericifolia, and E. hirta. The latter two plants are generally somewhat difficult to identify to species. They are characterized by fleshy, ascending stems, and opposite leaves. Euphorbia maculata is relatively common in the vicinity of camp. Euphorbia peplus is also seen in camp, but in less frequency. E. hirta and E. hypericifolia have not been documented in recent years and may have been extirpated.



Figure 49: Euphorbia hirta on Maui, HI

Figure 50: Euphorbia hirta on Maui, HI



Figure 51: Euphorbia hypericifolia at Midway Atoll Figure 52: Euphorbia hypericifolia at Midway Atoll

Flaveria trinervia Flaveria

Flaveria, a non-native plant, is a small, erect shrub in the Aster family. Flaveria is characterized by variable ovate to lanceolate (oval to lance shaped) leaves. The leaves have a distinctive 3-nerve pattern that gives it its specific epithet. In shaded habitat it often has soft, light green, serrate (toothed) leaves. In open habitat it is more likely to have dark, coarse leaves, often tending towards red or reddish green.



Figure 53: Flaveria trinervia with distinctive 3-nerve pattern

Flaveria cotyledons are ovate and lack nerves as can be seen in the following photos. The two plants in the first image were found growing in shaded conditions. In the photo on the right Flaveria (upper left) can be readily distinguished from Boerhavia repens (lower right). Note the reddish green color of the Flaveria. Plants found on the runway can be almost completely dark reddish, with very coarse leaves, in stark contrast to leaves found in the Naupaka margin at the edges of the runway. Flaveria leaves are sessile (lacking a stem) to connate (literally joined), especially on the upper stem. Early leaves lack dentition (teeth).





Figure 55: Flaveria trinervia (left) and Boerhavia repens (right)

These dark specimens found growing in West Turnaround RA have ovate, nerveless cotyledons. The plant below left has obvious nerves in the true leaves. In the plant below right the true leaves are too young to show nerves yet, but they will presumably grow in with time.



Figure 56: Flaveria trinervia growing on open hard pack



Figure 57: Flaveria trinervia growing on open hard pack

Description: Taprooted annual herbs 1.5-8 (-20) dm tall, puberulent or subglabrous; stems often purplish, divaricately branched. Leaves lanceolate, oblanceolate to elliptic or narrowly ovate, 3-15 cm long, (0.7-) 1-4 cm wide, distinctly 3-nerbed from base, margins subentire to serrate-dentate, petioles of principal leaves 1-2 cm long, petiole bases nearly connate, upper leaves sessile and usually connate. Heads with a single floret, aggregated

into secondary head-like clusters ca. 1 cm in diameter the common receptacle thus formed with scattered bristles ca. 1/2 as long to as long as primary heads, secondary heads subtended by a few leafy bracts, heads radiate or discoid, radiate heads usually peripheral in secondary heads, the central ones usually discoid; involucre of primary heads of 1-2 bracts, 3-4.5 mm long; rays pale yellow or whitish, 0.5-1 mm long; disk corollas 2-2.5 mm long; pappus absent. Achenes 2-2.6 mm long (Wagner *et al., 1999; p. 317).*

Heliotropium foertherianum

Beach Heliotrope

Heliotropium is the only common woody-stemmed tree on Kure. It has large, soft, pale green leaves. It is non-native on Kure, and competes with Scaevola taccada (Naupaka), and hence is a target for control and eradication.



Figure 58: Heliotropium foertherianum

Heliotropium cotyledons are tiny, resemble Verbesina in shape, but are generally fleshier, a bit more long and slender, and are noticeably pubescent with numerous stiff white hairs.



Figure 59: Heliotropium foertherianum

Figure 60: Heliotropium foertherianum

By the four leaf stage Heliotropium leaves are distinctive, roughly oval, still coarsely pubescent, and with a broad central nerve.



Figure 61: Heliotropium foertherianum

Description: This distinctive small umbrella-shaped evergreen tree with very short trunk, low widely forking branches, and very broad rounded spreading crown of gray green foliage, was introduced on sandy shores. To 20 ft (6 m), with trunk to 1 ft (0.3 m) in diameter and crown to 40 ft (12 m) across, often flowering as a low shrub. Bark light brown or gray, rough, very thick, deeply furrowed into narrow oblong plates and ridges. Outer bark streaky blackish brown, inner bark light brown, fibrous, tasteless. Twigs stout, finely hairy, gray green, becoming brown, with raised half-round leaf scars and buds of small overlapping leaves. Leaves alternate, crowded near ends of twigs, gray green, covered with tiny pressed hairs, with short stout leafstalk about 3/8 inch (1 cm) long.

Blades narrowly elliptical or obovate, 3–7 inches (7.5–18 cm) long, 1–21/4 inches (2.5–6 cm) wide, thick and slightly succulent, rounded at apex, widest beyond middle, tapering to longpointed base, not toothed, with few side veins, dull gray green on both surfaces. Flower clusters (cymes) terminal, 6–8 inches (15 cm) long including long stalk, the many branches curved to one side. Flowers many, crowded, stalkless, erect on horizontal curved or coiled branches, bell-shaped, less than 1/4 inch (6 mm) long and broad, composed of five rounded hairy gray green sepals, white corolla with short hairy tube and five spreading rounded lobes, five tiny stamens in notches of corolla, and pistil with conical ovary and slightly two-lobed stigma. Fruit rounded, flattened, about 1/4 inch (6 mm) in diameter, smooth and shiny, green, slightly watery, containing two or four large half-round brown nutlets 1/8 inch (3 mm) long, embedded in a corky or spongy mass.

Ipomoea indica

Koali 'awa

Ipomoea indica is one of two morning glories native to Kure Atoll. It is the more common of the two and is abundant around camp. The leaves are large, broadly ovate, and have a pointed tip. The flowers are varying shades of purple.



Figure 62: Ipomoea indica

Figure 63: Ipomoea indica

Description: Vines; stems twining, herbaceous to somewhat woody near base, often more than 5 m long, many-branched, appressed pubescent to glabrate. Leaf blades membranous, broadly ovate, 5-9 cm long, densely pubescent, especially on lower surface, or glabrate or completely glabrous, 3-lobed or entire, apex acuminate to obtuse, base cordate, petioles about as long as blades. Flowers 1 to few in cymes, these usually silky white pubescent, pedicels ca. 10 mm long; sepals herbaceous, lanceolate to ovate, 14-23 mm long, appressed pubescent to glabrate, apex long-acuminate to acuminate; corolla blue or purple, rarely white, funnelform, 5-7 cm long, the limb 6-8 cm in diameter. Capsules brown, often 4-angled, globose or somewhat flattened apically, up to 1 cm in diameter, glabrous. Seeds (1-) 4, tan to dark brown, rounded, 4-5 mm long, glabrous (Wagner *et al., 1999; pp. 556-557).*

Ipomoea pes-caprae

Pohuehue

Ipomoea pes-caprae, native to Kure, takes its specific epithet from the shape of the leaf, cloven like the shape of a goat's hoof (*pes* is Latin for foot, *caper* Latin for goat). It has varying shades of purple flowers. It is less common then its congener, I. indica, and can be found in most abundance at the West Landfill.



Figure 64: Ipomoea pes-caprae

Figure 65: Ipomoea pes-caprae

Lepidium virginicum

Peppergrass

Lepidium is a low growing non-native plant with leaves radiating outward on long flanged stems. Color ranges from dark green to a dark reddish green. It is common in camp.



Figure 66: Lepidium virginicum

Lepidium cotyledons are oval to egg shaped and soon grow out on long stems. The cotyledons are nerveless and lack the coarse hairs that appear on later leaves.



Figure 67: Lepidium virginicum

Figure 68: Lepidium virginicum

Subsequent leaves are coarsely pubescent (hairy) and spoon shaped. Toothed margins appear only at later stages.



Figure 69: Lepidium virginicum



Figure 70: Lepidium virginicum

Description: Annual or biennial herbs; stems 2-7 dm long, usually single from base, branched above, occasionally many-branched, usually puberulent. Basal leaves oblanceolate, 4-15 cm long, sharply toothed to pinnatifed, occasionally bipinnatifid, upper leaves much-reduced, oblanceolate to linear, margins dentate to entire. Flowers in elongate racemes usually 1.5-8 cm long, nearly the same diameter throughout; sepals ca. 0.5 mm long, usually caducous, margins white; petals spatulate, ca. 0.6-1 mm long; stamens 2 (4, 6). Silicles suborbicular to broadly elliptic, 2-4.2 mm long, the apical notch broad, prominent, the margins clearly exceeding the style. Seeds 1.5-2 mm long (Wagner *et al., 1999; p. 409).*

Lobularia maritima

Sweet Alyssum

Lobularia, a non-native plant, is easily identified by its white flowers and long slender leaves. It is common throughout the island. The cotyledons are ovate and can be difficult to differentiate from other plants, especially Verbesina. The first two true leaves also briefly resemble Verbesina leaves before they grow into the long slender form characteristic of adult plants.



Figure 71: Lobularia maritima

Lobularia cotyledons are ovate to egg shaped and can be differentiated from Verbesina by the shape of the base of the leaf, which rounds sharply to the stem. When very young, before the leaves are well separated, it can be somewhat difficult to see this part of the leaf.



Figure 72: Lobularia maritima

Figure 73: Lobularia maritima

As the seedling grows the stem elongates and the first two true leaves appear. When very small these also resemble Verbesina leaves, but as they grow they soon become much more long and slender than Verbesina. Lobularia stems range in color from white to light purple.



Figure 74: Lobularia maritima

Figure 75: Lobularia maritima

Though not truly glabrous, the hairs that eventually cover the surface of Lobularia leaves are very fine and are appressed (lying flat). The first true leaves (below left) generally appear hairless and hence shiny. At later ages the hairs give the leaves a soft white-green or silvery appearance.



Figure 76: Lobularia maritima

Figure 77: Lobularia maritima

Description: Herbs perennial, sometimes suffruticose, (5-) 12-24 (-40) cm tall, silvery pubescent. Stems erect, ascending, procumbent, or decumbent, basally branched; pubescent. Leaves linear, lanceolate, or oblanceolate, (1-) 1.5-2.5 (-4) cm x (0.8-) 1.5-3 (-6.5) mm, pubescent, base attenuate, margin entire, apex acute to subobtuse. Racemes many
flowered, elongated considerably in fruit. Fruiting pedicels divaricate or ascending, straight, slender, (3-) 5-7 (-10) mm, pubescent. Sepals green or purple, oblong, 1.5-1.8 (-2.4) x 0.5-1 mm, pubescent. Petals white or deep purple, obovate or suborbicular, 2-3 x 1.5-2.5 (-3) mm, abruptly narrowed to claw; claw to 1 mm. Filaments white or purple, 1.2-2 mm; anthers ovate, 0.3-0.5 mm. Fruit ovate, elliptic, or orbicular, (2-) 2.3-3 (-4.2) x (1.2-) 1.5-2 (-3) mm; valves convex, pubescent, with a distinct midvein; style 0.4-0.6 mm. Seeds light to reddish brown, 1 per ovary, lenticular, ovate or suborbicular, wingless or with a narrow wing to 0.1 mm wide (Flora of China online).

Oenothera laciniata

Cutleaf Evening Primrose

Oenothera laciniata is a non-native annual herb with long, slender, dentate (toothed) leaves and white flowers. The common name comes from the fact that flowers usually open just before sunset. It is now mostly found in camp and West Turnaround RA.



Figure 78: Oenothera laciniata

Oenothera cotyledons are cuneate (wedge shaped) and broadly rounded at both the tip and base. They share this basic shape with Anagallis, which differs in being sessile (lacking a stem) so that the two cotyledons butt up against each other. The first true leaves are generally elliptic (oval, rounded at both ends) and sometimes tightly clustered. Close examination reveals coarse bristles on the leaves.



Figure 79: Oenothera laciniata

Figure 80: Oenothera laciniata

As the plant grows the central nerve becomes prominent and the leaves are oblanceolate (lance shaped but wider towards the end). These basal leaves differ somewhat from the cauline leaves (leaves growing from a stem), which are described as obovate (oval, wider at the ends) to narrowly elliptic. We rarely see Oenothera reach this stage and they are presumably easy to identify based on the flowers.



Figure 81: Oenothera laciniata



Figure 82: Oenothera laciniata

Though somewhat similar in form, Oenothera (left) is easily distinguished from Lepidium (middle), and Sonchus (right) based on color and leaf dentition. The teeth on Oenothera leaves are larger, broader, and more rounded than either Lepidium or Sonchus. Plants of Kure Atoll Identification Guide 3 March 12, 2018



Figure 83: Oenothera laciniata Figure 84: Lepidium virginicum Figure 85: Sonchus oleraceus

Description: Taprooted annual herbs; stems erect to procumbent, 0.5-5 dm long, usually branched, strigillose, sparsely villous, and usually glandular pubescent in inflorescence. Basal leaves oblanceolate, 5-13 cm long, 1-3 cm wide, margins lobed or dentate; cauline leaves narrowly obovate to narrowly elliptic, 2-10 cm long, 0.4-3.5 cm wide, lobed, dentate, or occasionally subentire. Flowers solitary in the leaf axils, usually only 1 opening each day per stem near sunset; floral tube 1.5-3.5 cm long; sepals with distinct tips 1-3 mm long; petals pale yellow or yellow, broadly obcordate, 0.5-1.3 (-2) cm long; pollen ca. 50% fertile; stigma surrounded by anthers at anthesis. Capsules 2.5-5 cm long. Seeds in 2 rows per cell, ellipsoid to subglobose, 0.8-1.8 mm long, the surface pitted. Self-compatible, autogamous, permanent translocation heterozygote (Wagner *et al.*, 1999; p. 1000).

Oxalis corniculata

Yellow Wood Sorrel

Oxalis corniculata is a low growing non-native plant characterized by heart shaped leaves growing in clusters of 3 and flowers with yellow petals. It is found in camp and in West Turnaround RA. It flowers when fairly small and is easy to overlook. It can be found year round.



Figure 86: Oxalis corniculata

Oxalis has reddish stems and a characteristic pattern of 3 heart shaped leaves. The cotyledons, which are not persistent, are roughly round (photo below).



Figure 87: Oxalis corniculata

Figure 88: Oxalis corniculata

Description: A caespitose or creeping herb, with stems rarely exceeding 50 cm in length, usually rooting at nodes and ascending toward apices, variably pilose on stems, petioles, and leaflet blades; stipules usually present but inconspicuous, to 3 mm long; indument composed of eseptate hairs (sometimes hairs of capsules septate); petioles 1-6 cm long, the leaflets subsessile and subequal, the blades obcordate, 4-20 mm long and broad, incised 1/4 - 1/2 their length, the sinus acute to obtuse, the lobes usually rounded; inflorescences 1-6-flowered, usually 2-7 cm long, the bracts and bracteoles deltoid-linear, 0.5-3 mm long, the pedicels 4-15 mm long, with eseptate hairs; sepals lanceolate to narrowly ovate, 2.5-6 mm long; petals yellow, oblong subspathulate, somewhat larger than sepals; capsules

subcylindric, acute, 5-20 x 2-4 mm, sometimes with septate hairs, with 5-10 seeds per locule. (Smith, 1985; pp. 625-626).

Portulaca oleracea

Purslane

Portulaca oleracea is a non-native cousin of Portulaca lutea, which is native to the Hawaiian Islands. It is found near the cistern and path in camp and occurs in several other locations on the island including the East turnaround.



Figure 89: Portulaca oleracea on Kure

Figure 90: Portulaca oleracea flower

P. oleracea cotyledons are ovate (oval), often with a faint purple margin (edge) and purple base. Leaves are somewhat mottled in appearance, with a speckling ranging from white to purplish. The true leaves are cuneate to obovate (wedge shaped to ovate but broader at the tip), nerveless, and fleshy.



Figure 91: Portulaca oleracea

Figure 92: Portulaca oleracea

Portulaca seeds are shiny obsidian black, pocketed with dimples like a golf ball but irregular (the botanical term is 'granulate'), mostly spherical but for a small blunt tipped horn. A spoonful of soil from a Portulaca patch will yield dozens to hundreds of seeds. It is a bit difficult to figure out how such a tiny seed turns into such a large sprout!



Figure 93: Portulaca oleracea seed

Figure 94: Portulaca oleracea sprout

Description: Prostrate, usually annual herbs; stems 1-2 dm long, profusely branched. Leaves alternate or subopposite, cuneate to obovate, 10-25 (-40) mm long, 5-15 (-20) mm wide, sessile, with an inconspicuous tuft of hairs ca. 1 mm long in the axil. Flowers 2-6 (-30) in cymose clusters; sepals 3-4 (-8) mm long, keeled; petals (4) 5, yellow, broadly obovate, 3-10 mm long; stamens 7-10 (-15); style (4) 5-branched. Capsules ca. 4 mm long, circumscissile 1/3-1/2 from base. Seeds black, glossy, ca. 0.5-0.6 mm in diameter, the surface granulate, cells of the testa with fine tubercles (Wagner *et al.*, 1999; p. 1072).

Pseudognaphalium sandwicensium var. sandwicensium 'Ena'ena

This variety of Pseudognaphalium, endemic to Kure and Midway Atolls, was not recorded on Kure until the 1960s. In 2001 it was reported as "occasional" near quarters, but there are no recent records of this species. It was recently discovered growing south of the runway in March, 2014.



Figure 95: Pseudognaphalium sandwicensium, 'Ena'ena

Young Pseudognaphalium plants have densely pubescent (hairy), obovate leaves (oval but wider at the tip), with a silvery green appearance. As the leaves grow out they become long and slender with a broad rounded tip. The leaves curl downward along the central axis and upward from base to tip.



Figure 96: Pseudognaphalium sandwicensium



Figure 97: Pseudognaphalium sandwicensium

Mature plants can grow as leggy ascending shrubs, though the plants observed on Kure tend towards dense, low growing mats in open areas. The flowers grow in compact clusters of fleshy globes and lack petals.



Figure 98: P. sandwicensium flower head

Figure 99: Mature P. sandwicensium on **Midway Atoll**

Sagina japonica Japanese Pearlwort

Sagina is a small, fleshy non-native plant with linear leaves growing in multiple rosettes from a central stem. It is seasonal, first occurring in November or December. It is fairly common in West Turnaround, Road to Runway, and Camp RAs.



Figure 100: Sagina japonica

It is not clear if Sagina has distinctive cotyledons. Leaves erupt in pairs; the second pair rotated 90 degrees from the first, later pairs rotated at intermediate angles forming a rosette.



Figure 101: Sagina japonica



Figure 102: Sagina japonica

At small sizes Sagina fairly closely resembles Spergularia marina. Sagina leaves are somewhat more flattened and pointed, compared to Spergularia leaves which are rounder in cross section and more likely to have blunt, rounded tips. See the Spergularia section for comparative photos.



Figure 103: Sagina japonica with flowers



Figure 104: Sagina japonica

Each Sagina flower turns into a small cup full of tiny seeds. The seeds are about 0.5 mm in diameter, dark reddish, and roughly kidney shaped.



Figure 105: Sagina japonica with seeds and flowers



Figure 106: Sagina japonica seeds (1mm scale)

Scaevola taccada

Naupaka

Scaevola is the ubiquitous native shrub of Kure, with large rubbery bright green leaves and white berries. It forms dense stands in places, other places less dense or pocketed with small clearings. It plays an important role in dune formation and provides habitat for both burrow nesting and tree nesting birds.



Figure 107: Scaevola taccada, Naupaka

Scaevola cotyledons are ovate, fleshy, and have a prominent tooth, usually light green or yellow, at the apex. The cotyledons lack veins, which do not become obvious until the plants reach a moderate size. A photo of the mature leaves is presented below.



Figure 108: Scaevola taccada

Figure 109: Scaevola taccada



Figure 110: Mature S. taccada leaves

Sesuvium portulacastrum

Sea Purslane, 'Akulikuli

Sesuvium is an introduced native plant with fleshy succulent leaves, red stems, and purple flowers. It is not common and is found mostly where outplanted in wet areas such as the seeps and the runway.



Figure 111: Sesuvium portulacastrum, 'Akulikuli

The succulent leaves of Sesuvium are relatively distinctive, only resembling Portulaca oleracea on Kure (hence the specific epithet). Sesuvium leaves are much longer and more slender than Portulaca, and the purplish red stems and magenta flowers are also good identifying characteristics.



Figure 112: Sesuvium portulacastrum

Figure 113: Sesuvium portulacastrum flower

Sicyos maximowiczii 'Anunu

Sicyos, a native plant, has become rare in the NW Hawaiian Islands. It is a vine in the same family as the cucumber, and has large leaves distinct from any other plant on Kure. It is common in the area north and west of East Turnaround RA and can be found in camp.



Figure 114: Sicyos maximowiczii, 'Anunu

Sicyos cotyledons are relatively large, roughly elliptic, and the stem is stout. No other plant on Kure produces cotyledons at nearly this size. The first true leaf is sometimes almost maple-leafed in shape, the margins initially somewhat toothed.



Figure 115: Sicyos maximowiczii

Figure 116: Sicyos maximowiczii

The true leaves grow in one at a time and become more rounded as they grow out on a long stem. The large size and light color of Sicyos leaves make them good at camouflaging Verbesina. Take care when treating areas with Sicyos as Verbesina will often be found hiding within.



Figure 117: Sicyos maximowiczii

Figure 118: Sicyos maximowiczii

Solanum americanum Glossy Nightshade

Solanum americanum is a non-native plant in the same genus as Solanum nelsonii, native to but extinct on Kure. Solanum americanum is widespread but not abundant and shares with Verbesina characteristics such as broad serrate (saw toothed) leaves. It can be found year round but germinates in abundance in the winter.

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Figure 119: Solanum americanum

Solanum cotyledons are ovate to lanceolate (lance shaped), usually with sharply pointed tips, and are densely pubescent (hairy), especially in the margins (edges). They often grow at some angle less than 180 degrees from each other. These characteristics make them fairly distinctive from other plants on Kure.



Figure 121: Solanum americanum

Solanum produces subsequent leaves singly, not in pairs, so that the youngest leaf is always small compared to its opposite leaf. The true leaves are ovate to nearly round when young, but become more pointed as they grow out. Some hairs on the true leaves are much more coarse.



Figure 123: Solanum americanum

At later stages the leaf margins develop dentition. Solanum teeth tend to be more rounded than in Verbesina, and more regular than in Chenopodium. The leaves still bear stiff white hairs, though they are much less densely spaced than on young leaves. The leaf shape is also very similar to Chenopodium but which has a slightly more squared off base and irregular dentition. The base of Solanum leaves tends to be fairly rounded with a flanged stem. See the Verbesina section for leaf comparisons.



Figure 124: Solanum americanum

Figure 125: Solanum americanum

Can you find the S. americanum in this photo?



Figure 126: Can you find the S. americanumi in this photo?

In addition to broader, more rounded teeth, S. americanum leaves (below left) have a slightly flanged stem. S. american leaves are also alternate (branching singly from different sides of the stem) versus opposite (branching in pairs from opposite sides of the stem) on Verbesina (below right).



Figure 127: Solanum americanum leaf

Figure 128: Verbesina encelioides leaf

Description: Annual or short-lived perennial herbs up to 1.2 m tall, erect or widespreading, straggly with age, sometimes flushed purplish; stems sometimes angled or narrowly winged with lines of tissue from base of petiole, the wings smooth or with sort soft teeth, unarmed, glabrous or sparsely pubescent with simple curbed hairs. Leaves simple, alternate, ovate to ovate-lanceolate, margins entire or with up to 8 short, blunt,

rounded lobes, sinuses shallow and rounded, greatly variable in Solanum americanum (PIER species info) http://www.hear.org/pier/species/solanum americanum.htm . Size, up to 10 cm long on young growth and up to 2 long on aged distal twigs, usually ca. 6 cm long and 3 cm wide, apex acute to acuminate, base truncate to cuneate and continued as a narrow wing along petiole, petioles 1-4 cm long. Flowers perfect, actinomorphic, in extraaxillary umbelliform cymes, peduncles 1-2.5 cm long, flowers congested at apex, pedicels 5-8 mm long; calyx campanulate, 1-2 mm long, the lobes obtuse, ca. 1 mm long; corolla white or occasionally purple tinged, stellate, 0.8-0.9 cm in diameter, with a yellowish green starshaped area, the lobes ca. 1.5 mm wide; stamens inserted near base of corolla tube; filaments with spreading hairs on inner side, 1-2 mm long; anthers oblong, 1.5-2 mm long, opening by pores or short slits; ovary globose, ca. 1 mm in diameter, glabrous; style erect, 2.5-4 mm long, pubescent in lower part; stigma capitate, at level of anther pores. Berries glossy black, succulent, readily shed when ripe, sclerotic granules 0-4, ca. 0.5 mm in diameter, pedicels erect or recurved in fruit, up to 4 cm long, calyx somewhat enlarged and often reflexed. Seeds numerous, 1-1.5 mm long, compressed, testa minutely reticulate (Wagner et al., 1999; pp. 1268-1269).

Sonchus oleraceus

Sow Thistle

Sonchus, a non-native plant, is not a true thistle, instead a member of the 'tribe' dandelion. It is nearly dimorphic, with coarse, pointed leaves when growing in exposed areas, tending towards soft, rounded leaves when growing in shade. It is uncommon but somewhat widespread, occurring from the southern part of Southwest Dunes, at Radar Hill, in camp, and in the northeast of the island. It occurs year round.



Figure 129: Sonchus oleraceus

Sonchus cotyledons are roughly spoon shaped with microscopically toothed margins and a short narrow flanged stem. Later leaves have long stems and the teeth on the margin become somewhat more apparent. Both of the photos below are of plants found growing in shaded conditions.



Figure 130: Sonchus oleraceus

Figure 131: Sonchus oleraceus

At later stages some leaves will be heavily dentate and the stems develop more complex flanges. The plants shown below were found growing in heavily shaded conditions, and have very soft, light-green leaves.



Figure 132: Sonchus oleraceus

Figure 133: Sonchus oleraceus

In unshaded conditions Sonchus leaves are more divided and pointed. Leaves grow radially from a central stem, are coarser, and darker green. Sonchus flowers are yellow and grow on stems which when cut exude a milky white sap.



Figure 134: Sonchus oleraceus

Sonchus produces the same fluffy white seed heads that we associate with dandelions. A single seed head produces hundreds of seeds and a single plant can produce dozens of seed heads. You can imagine that a single seeding plant can re-seed much of the island in the right (or wrong) conditions.



Figure 135: Sonchus oleraceus seed head

Figure 136: Sonchus oleraceus seed

Spergularia marina

Lesser Sea Spurry

Spergularia, a non-native plant, is one of two members of the pearlwort family on Kure. It is characterized by fleshy succulent leaves, purplish flowers, and often some purple in the stem. Sagina, the other pearlwort, has white flowers, but is similar to Spergularia, especially at very small sizes. Spergularia can occur year round but is somewhat seasonal, becoming much more abundant in December or January. It is mostly found in Camp, Runway, and Turnaround RAs.



Figure 137: Spergularia marina

In early stages Spergularia and Sagina are very similar, with color variable from green to greenish yellow in both plants. The main distinguishing characteristic is the more rounded leaves of Spergularia compared to flattened and pointed leaves in Sagina. Note that the shorter leaves are somewhat pointed in Spergularia as well, so plants of this size must be examined carefully.



Figure 138: Spergularia marina

Figure 139: Sagina japonica

At later stages Spergularia (below left) tends towards a somewhat disordered growth pattern while Sagina (below right) continues to grow as radiating rosettes of leaves in dense clusters. Spergularia is most commonly a pale to yellow green, or darker green to purplish as in the photo on the title slide. Sagina is usually dark green. Spergularia is

restricted in distribution occurring mostly in Camp, Runway, and Turnaround RAs. It can occur year round but is more likely to appear in abundance during the winter months.



Figure 140: Spergularia marina

Figure 141: Sagina japonica

A distinctive characteristic of Spergularia is the tendency for early leaves to wither and die, and for the tips of some leaves to wither, leaving a thin extension of the leaves that appears almost hair-like unless viewed with magnification. This behavior is either less likely or absent in Sagina.



Figure 142: Spergularia marina

Figure 143: Spergularia marina

Stellaria media

Common Chickweed

Stellaria, a non-native plant, is seasonal, usually first appearing in December. It has trailing branching stems and numerous egg-shaped to elliptic leaves, usually with an obvious tooth at the apex. It is found in Camp, along the 'Anunu/East Turnaround border, and in West Turnaround.



Figure 144: Stellaria media

Stellaria cotyledons range from long and slender to almost perfectly egg shaped. At this stage the apical (at the apex) tooth is not obvious, but almost always present either as a slight discoloration, or a slight point at the apex. Once the true leaves appear the apical tooth is generally obvious and distinguishes Stellaria from all other plants on Kure.



Figure 145: Stellaria media



Figure 146: Stellaria media

Here the true leaves distinctly show the elliptic leaf shape and apical tooth characteristic of Stellaria. The true leaves also have a central vein that is roughly straight, but on close observation can be seen to be a bit squiggly. Stellaria grows into dense mats.



Figure 147: Stellaria media

Description: Slender annual or perennial herbs; stems trailing, matted, or weakly ascending, 1-8 dm long, pubescent in lines. Leaves ovate to elliptic, (0.5-) 1-3 (-4) cm long, (0.3-) 0.8-1.5 (-2) cm wide, base rounded to cuneate, petioles 0-2 cm long, often ciliate. Pedicels ascending to recurved; sepals 3.5-6 mm long, villous, apex obtuse to acute; petals slightly shorter than the sepals, 2-cleft, or sometimes absent; stamens 3-10. Capsules ovoid, 3.5-7 mm long. Seeds reddish brown, suborbicular, 1-1.1 mm long, papillose (Wagner *et al., 1999; pp. 526-528).*

Tribulus cistoides

Goat's Head or Puncture Vine

Tribulus is native to Kure and is abundant in open areas. Its leaf pattern and yellow flowers are unmistakable. Tribulus produces sharp thorny seeds that will get your attention. There is some die-back of Tribulus in winter, but otherwise it is perennial.



Figure 149: Tribulus cistoides

Tribulus cotyledons are large and blunt ended, giving them an almost rectangular shape, and have an obvious central nerve. The seeds are large so if in doubt you can always dig one up, though dig with care lest you get a thorn in the finger!



Figure 150: Tribulus cistoides sprout with seed

Figure 151: Tribulus cistoides

The true leaves grow out one at a time and are immediately recognizable by the many branched leaf pattern (technically paripinnate, a word that doesn't even occur in my dictionary of biology). Tribulus grows as a trailing vine with weak nodes, so if you try to pull up one vine it will generally separate from the rest of the plant.



Figure 152: Tribulus cistoides

Figure 153: Tribulus cistoides

Description: Prostrate trailing subshrub, branches subascending; leaves paripinnate, leaflets about 8 pairs, oblong; silky-pubescent, about 1 cm long; stipules falcate acuminate; flowers solitary, yellow, sepals 5, silky; petals 5, obovate; stamens 10, on base of annular 10-lobed disc, 5 longer ones opposite the petals, 5 shorter ones each with a dorsal gland; ovary sessile, hirsute, style short, stigmas 5; fruit of horned woody cocci, tuberculate, pubescent, partitioned within, compartments 1-seeded (Stone, 1970; p. 349).

Verbesina encelioides

Verbesina

Verbesina are generally easily distinguished from most other plants on Kure based on broad serrate leaves (saw toothed), an ascending stem, and orange-yellow flowers. In mature stands Verbesina can reach heights of 7-8 feet, but you can also find mature plants as small as 3 inches tall. Few other plants on Kure have broad leaves and most can be readily distinguished from Verbesina.



Figure 154: Verbesina encelioides



Figure 155: Mature Verbesina encelioides

If you take away scale, the three leaves below look very similar (From left to right: Verbesina, Solanum, Chenopodium). Once you notice the watch buckle in the 1st and 3rd photos, and the thumb in the 2nd, the small sizes of the leaves below is a clue. Other distinguishing characteristics are the rounded teeth and flanged stem in the Solanum, and the irregular teeth in the Chenopodium.



At the cotyledon stage it can be difficult to distinguish Verbesina from Lobularia maritima. Verbesina at this age often show a white or light leaf margin. A more reliable characteristic,

however, is the shape at the base of the leaf. Verbesina leaves taper gradually to the stem, compared to Lobularia, which is rounded off before the stem. In the picture at lower left, several Verbesina are joined by a single Lobularia (second from right). Note the shape of the base of the leaves comparing the leftmost plant with the Lobularia. The picture below right shows Verbesina on the left.



Figure 160: Verbesina (left) and Lobularia (right)

The first true leaves begin to show the characteristic serrate (saw toothed) leaf margin (edge) and are broad, compared to a long slender second pair of leaves on Lobularia. Though difficult, the first true leaves on Verbesina are pubescent, bearing stiff white hairs.



Figure 161: Verbesina encelioides

Leaf shape and color in young plants is highly variable based on conditions, with color ranging from dark green nearly to yellow, and from oblong to spoon shaped. Both Verbesina and Lobularia are pubescent, or hairy, a trait that is apparent from the first true

leaves on, but the hairs on Verbesina are coarser and more readily visible. The hairs on Lobularia, also white, are appressed (lying flat) and give the leaves a soft whitish-green appearance.



Figure 162: Verbesina encelioides

Figure 163: Verbesina encelioides

Leaf characteristics can also differ substantially in larger plants. In the two examples below the number, size, and sharpness of the teeth are dramatically different, but in both cases these can be identified as Verbesina due to the lack of a flange on the stem.



Figure 164: Verbesina encelioides

Figure 165: Verebsina encelioides

Description: Taprooted annual herbs; stems 2-10 dm long, many-branched. Leaves opposite, upper ones alternate, ovate or deltate, 4-15 cm long, 2-10 cm wide, both surfaces canescent-strigoese, sometimes less so on upper surface4, margins coarsely and often

irregularly serrate, petioles dilated at base to form a pair of stipule-like auricles. Heads solitary at the ends of long peduncles or in clusters of 2-3, radiate; involucral bracts ca. 15, green, subequal, linear, 7-15 mm long; ray florets 10-15 per head, pistillate, rays bright yellow, 10-25 mm long; disk florets numerous, corollas yellow, ca. 8 mm long. Achenes winged (Wagner *et al., 1999; p. 372).*

The Monocots: Practical Aspects of Plant Identification

The most commonly encountered non-native plants on Kure are the grasses. Cenchrus echinatus, Eleusine indica, and Setaria verticillata are the most abundant grasses in the interior meadows, Sporobolus pyramidatus in open sand and exposed areas (especially the runway). Eragrostis amabilis is most commonly found in the dunes, but Cenchrus, Eleusine, and Setaria are also found there. Seasonal grasses appear in the winter, mostly in open areas. Developing an effective search image to distinguish these plants from the native grasses should be the first task that you undertake.

Cenchrus, Eleusine, and Setaria are most readily distinguished from E. variabilis by the presence of a central keel, and by having somewhat softer, thinner, usually prostrate blades. Blade width is sufficient to distinguish them from smaller native and non-native grasses.

Sporobolus and E. amabilis are generally easy to distinguish from Lepturus, E. variabilis, and E. paupera when they are large, but it is much harder as sprouts. Take time to learn the characteristics of these plants or you may end up killing a lot of native grasses. Poa annua is very difficult to distinguish from E. paupera when it is small. E. paupera is generally only found on the runway, Poa annua elsewhere, but it is worth studying the two, and you should become familiar with E. paupera before working on the runway. Poa annua and Polypogon interruptus are also often very difficult to distinguish without practice.

Cenchrus echinatus

Sandbur

Mature Cenchrus echinatus (non-native) are easily spotted by their seed heads, loaded with spiky burs ready to attach to anything that comes their way. For non-seeding plants the most reliable character is the reddish color found at the basal part of the stem, and often into the upper stem and leaves, especially in older plants. Cenchrus have moderately broad, prostrate, and somewhat curled blades with a central keel. The extent of red in the plant is probably correlated with stressors such as cold temperature or dry conditions. The only other grass with red in the basal part of the stem is Eragrostis amabilis, from which it can generally be distinguished based on size and blade width.



Figure 166: Cenchrus echinatus seed head

The distinct keel on Cenchrus blades is a quick feature with which to distinguish it from E. variabilis. It is more obvious when seen on the bottom of the blade. Also note the faint red edge to the blade.



Figure 167: Cenchrus echinatus leaf



Figure 168: Cenchrus echinatus with red stems

The distinct keel on Cenchrus blades is a quick feature with which to distinguish it from E. variabilis. It is more obvious when seen on the bottom of the blade. Also note the faint red edge to the blade.



This cluster of Cenchrus cotyledons largely lack red in the stem, though the right and leftmost plants show varying amounts of red.



Figure 171: Cenchrus echinatus
Description: An annual grass that is erect or decumbent at the base, somewhat tufted, branched; roots fibrous; culms 25 to 90 cm tall, the lower part often prostrate, compressed, rooting at the nodes, often reddish at the nodes; leaf sheaths smooth or with few stiff hairs on the margins on the upper portion; ligule 0.5-1.7 mm long, with marginal hairs; blades smooth to hairy, 5 to 30 cm long, 0.5 to 1 cm wide, flat, lower surface smooth, upper side rough, slightly hairy at the base; inflorescence a spike, dense, cylindric, 2.5 to 10 cm long, about 1 cm in diameter; the burs five to 50 or more, not crowded, almost sessile, globular, densely arranged, 3 to 6 mm in diameter, 5 to 10 mm long; the spines or bristles 2 to 3.5 mm long, usually turning purple with age, sometimes straw-colored, the basal bristles numerous, usually turned downward, inner bristles attached below the middle of the the bur, bristles united for about one-half their length to form a deep cup, hairy, bristles irregular in size and thickness; spikelets two to four (usually three) in each bur, about 5 to 7 mm long; stamens three; grains ovoid, 1.6-3.2 mm long, 1.3 to 2.2 mm wide. The species is distinguished by the large, spiny burs, which are easily detached from the flowering spike. The burs are covered with numerous, sharp bristles, which usually turn purple with age and may be strong enough to penetrate shoe leather. There is a variety in Hawaii, variety *hillebrandianus*, in which the plants are softly hairy throughout rather than just at the base of the leaves (Holm *et al.*, 1977; p. 201).

Cynodon Dactylon

Bermuda Grass

Cynodon was planted by the Coast Guard as a lawn grass. It forms dense, sometimes monodominant stands in several parts of the central plain including camp. It appears to be an excellent material for lining nests.



Figure 172: Cynodon dactylon and Laysan albatross

Cynodon does produce seeds however much of the growth and propagation is vegetative. Cynodon mats are mostly composed of long runners that re-root where they contact the ground. The creeping stems are diagnostic and Cynodon is generally easy to distinguish from other grasses based on its vine-like nature. Cynodon seed heads resemble Eleusine but are more slender, and the two plants are easy to distinguish. A picture of a Cynodon seed head is presented on the following slide.



Figure 173: Cynodon dactylon

Figure 174: Cynodon dactylon



Figure 175: Cynodon dactylon seed head

Cyperus rotundus Nutgrass

Cyperus rotundus is a non-native sedge mostly found growing in the vicinity of Camp RA. It has a generally erect posture and the blades a corrugated form that in cross-section look like a bird in flight, making it relatively easy to distinguish from the grasses.



Figure 177: Cyperus rotundus

Cyperus rotundus takes its common name from the fact that it grows from a small bulb, though it also can sprout from seed. It is not particularly susceptible to glyphosate-based herbicides and is best treated with a sedge specific treatment.



Figure 179: Cyperus rotundus and seed (left), Coronopus didymus (right)

Dactyloctenium aegyptium Beach Wiregrass

Dactyloctenium was first found on Kure in 2008. It is a high priority for eradication, but unfortunately has spread to several widespread sites on the island. It is most readily identified by its wavy leaf margin, which can be seen in the photo below.



Figure 180: Dactyloctenium aegyptium, Beach wiregrass

Dactyloctenium cotyledons are difficult to observe. Early leaves often wither and die (below left), leaving a sheath from which later blades grow. In some conditions the cotyledon will persist, though, and one can be seen in the photo below right, the blade pointing upward to the left. The cotyledons, like in most grasses, are relatively long and narrow, with little taper until very near the end.



Figure 181: Dactyloctenium aegyptium

Figure 182: Dactyloctenium aegyptium

At very small sizes Dactyloctenium true leaves are very similar to Setaria, with wide tapered blades of roughly the same size. In the photos below Dactyloctenium is on the left, Setaria on the right.



Figure 183: Dactyloctenium aegyptium



Figure 184: Setaria verticillata

Though difficult to discern without magnification, beach wiregrass can be distinguished from Setaria, and from other broad bladed non-native grasses, based on the presence of fine teeth on the blade margin. In botanical terms the blades are described as 'papillose-hispid, especially along margins', where hispid refers to the rough texture caused by the presence of stiff hairs, bristles, or minute teeth.



Figure 185: Dactyloctenium aegyptium

Figure 186: Sharp pointy teeth on D. aegyptium

At later stages Dactyloctenium tends to be very crowded, producing many densely crowded broad blades, and many tightly clustered additional stems. By this stage the wavy leaf margins are also generally easy to see.



Figure 187: Dactyloctenium aegyptium

Figure 188: Dactyloctenium aegyptium

In large plants Dactyloctenium is still probably most similar to Setaria, with broad blades, and stems growing radially out from a central point. In general Dactyloctenium is darker green, and as the stems become long they develop joints, or nodes, one of which is visible in the photo below left, in the stem pointing upward and to the right. Dactyloctenium will reroot at these nodes, which leads to the mat forming characteristic of this grass.



Figure 189: Dactyloctenium aegyptium

Figure 190: Setaria verticillata

Beach wiregrass seed heads are somewhat similar to Eleusine but with more numerous, short spikes (3-9) and larger seeds.



Figure 191: Dactyloctenium aegyptium seed head

Description: Slender to moderately robust, spreading annuals; culms 70-100 cm tall, usually geniculately ascending and rooting at lower nodes, usually stoloniferous and matforming. Sheaths 2.5-4 cm long, compressed, glabrous or with a few bulbous-based hairs on the keel; ligule a narrow fimbriate membrane; blades flat, 3-25 cm long, 2.5-7.5 (-12) mm wide, papillose-hispid, especially along margins. Inflorescences composed of (1-) 3-9 linear to narrowly oblong spikes 1.2-6.5 cm long, ascending to radiating horizontally from top of culm; spikelets 3-4-flowered, broadly ovate, 3.5-4.5 mm long; glumes subequal, 1.5-2.2 mm long, first glume lanceolate in profile, keel thick, scabrid, second glume elliptic to narrowly obovate in profile, keel smooth, prolonged into a stout, divergent, scabrid awn 0.5-2 times as long as the glume; lemmas narrowly ovate to ovate in profile, 2.6-4 mm long, keel gibbous, concave and scabrid above the middle and usually prolonged into a stout cusp or mucro up to 1 mm long; palea keels more or Dactyloctenium aegyptium (PIER species info) http://www.hear.org/pier/species/dactyloctenium_aegyptium.htm 1 of 21 8/1/11 1:35 PM less winged. Caryopsis broadly obovate to triangular, ca. 1 mm long, transversely rugose (Wagner *et al., 1999; pp. 1521-1522).*

Eleusine indica

Goosegrass

Eleusine is one of the most common non-native grasses on Kure. It has a long branched seed head, and is characterized by long narrow blades, which have a distinct keel. The blades are soft and often prostrate, compared to the more rigid upright blades of Eragrostis variabilis. It can be distinguished from Cenchrus based on the reddish basal stem of the latter, and from Setaria based on blade width and color.



Figure 192: Eleusine indica, or Goosegrass, seed head

Eleusine cotyledons are usually very long and slender. It is somewhat more common to see Eleusine at this single-bladed stage then other grasses. Following blades are also relatively long and slender, though there can be a lot of variability, especially in young plants.



Figure 193: Eleusine indica

Figure 194: Eleusine indica

At a young age Eleusine blades can be virtually identical in aspect ratio to Setaria blades. Both of the plants below have long narrow cotyledons, wider, more tapered following blades, and fine striations. The keel is somewhat more pronounced on the Eleusine (left) but it would be hard to definitively distinguish these plants to species at this size.



Figure 195: Eleusine indica

Figure 196: Setaria verticillata

Eleusine has striations on the blades but they are very narrow, hence the blades are generally darker green, and the central keel is more apparent than in Setaria. Also note the fine white hairs that grow on the stem and dorsal surface of the blades of older Eleusine. These are lacking on Setaria.



Figure 197: Eleusine indica

Figure 198: Eleusine indica

Eragrostis amabilis

Japanese Lovegrass

E. amabilis is a non-native plant that can generally be distinguished by prostrate stems with a reddish base, narrow leaves, and an open panicle (seed head). It is most commonly found in open areas in the dunes. It occurs in the interior but is probably often suppressed by other plants so is most likely to be found in disturbed or open areas.



Figure 200: Eragrostis amabilis

E. amabilis is often found in the same habitat as Lepturus repens, a native grass. Very small plants can generally be distinguished based on the reddish stem, broader flat leaves (compared to narrow, somewhat curled leaves on Lepturus), and the more erect growth pattern of Lepturus.



Figure 201: Eragrostis amabilis

Figure 202: Eragrostis amabilis

Eragrostis paupera Dwarf Eragrostis

Eragrostis paupera, a native grass, is truly a dwarf. It can produce seed as little more than a sprout. Large plants are seldom more than a few inches tall or wide. It can be found abundantly on the runway but is rare elsewhere except due to out planting.



Figure 204: Eragrostis paupera

Young sprouts of E. paupera are characterized by opposite curled leaves, with early leaves often withering to a brown sheath from which later leaves grow. See the Poa annua section for comparative photos of those to plants as sprouts. At this stage they are very similar to Fimbristylis.



Figure 205: Eragrostis paupera

Figure 206: Eragrostis paupera

At intermediate stages E. paupera is structurally almost identical to Poa annua. Leaf shape, texture, color, and branching can all be very similar in both species. But, placed in context E. paupera is generally much smaller at this stage than Poa annua.



Figure 207: Eragrostis paupera

Figure 208: Poa annua

As can be seen in the photos below, Poa annua that is branching at the base may be 2-3 times larger than E. paupera at the same stage. In the photo below right E. paupera has already started seeding. Poa annua generally will be much larger before it begins to produce seed.



Figure 209: Poa annua (left), E. paupera (right)

Figure 210: Poa annua (left), E. paupera (right)

At even larger sizes the two plants no longer are difficult to discriminate. E. paupera grows from a central stem and radiates outward in a generally linear fashion, Poa annua grows in disorganized clusters, with heavily curved blades. While Poa annua can range in color from light to dark green, it rarely resembles the pale grayish-green color of E. paupera.



Figure 211: Eragrostis paupera

Figure 212: Poa annua

Eragrostis variabilis

Kawelu

Eragrostis variabilis, a native grass, forms in dense bunches and is the largest grass found on Kure. It is characterized by long, stiff, flat blades lacking a central keel.



Figure 213: Eragrostis variabilis, Kawelu

Kawelu cotyledons are slender and very small. They, and other early blades, are usually somewhat curled. Kawelu tends to germinate in the winter, and sprouts can be seen as

dense clusters of tiny, almost hair-like blades growing at the base of mature bunches. The blades are very long and narrow compared to Cenchrus, Eleusine, and Setaria.



Figure 214: Eragrostis variabilis

As Eragrostis grows it generally has an erect posture and the blades begin to take on a characteristic corkscrew twist. These older blades also have a dark shiny surface that is noticeably different from other grasses on Kure. The blades lack a central keel that is seen on Cenchrus, Eleusine, and Setaria.



Figure 217: Shiny leaves of E. Variabilis

In the photo below several Eragrostis sprouts are joined by a single Eleusine sprout. The Eleusine is broad and tapered by comparison to the narrow Eragrostis blades.

Figure 215: Ergarostis variabilis



Figure 218: Eragrostis variabilis and Eleusine indica (right center)

E. variabilis seeds generally germinate in greatest number in the winter. Young sprouts are very small and slender, and can be easy to overlook. When they grow in conjunction with broader bladed non-native grasses they are probably often sprayed. Keep an eye out for clusters of slender bladed, upright sprouts in the vicinity of mature plants.



Figure 219: Eragrostis variabilis sprouts

Figure 220: Eragrostis variabilis sprouts and Tribulus cistoides

Fimbristylis cymosa Button Sedge, Mau'u 'aki 'aki

Fimbristylis is a native sedge growing in dense clusters of stiff curved blades. It is common on the runway and has been out planted in other open areas.



Figure 221: Fimbristylis cymosa

Fimbristylis seedlings are very small and it is difficult to find them at the cotyledon stage. Early leaves are both curled and curved, like later leaves, with additional leaves growing out in a rosette pattern. Leaf shape and growth pattern at this age is similar to Eragrostis paupera.



Figure 222: Fimbristylis cymosa

Figure 223: Fimbristylis cymosa

Lepterus repens

Lepturus

Lepturus is native to Kure. Its range was very restricted as recently as 2001, but outplanting and the spread of seeds by the 2011 tsunami have distributed it widely along the west coast where it is now abundant. It grows in bunches with long round stems.



Figure 224: Lepturus repens

Lepturus cotyledons are long and relatively broad compared to the first true leaves, with a consistent width over most of the length of the blade, then tapering abruptly to a point. The blades have fine but distinct striations.



Figure 226: Lepturus repens

Young sprouts are characterized by stiff, narrow, curved and curled blades (below). It is most likely to be found growing in conjunction with Sporobolus (below left), which has broad tapered blades, an E. amabilis (below right), which has relatively short broad leaves and a reddish basal stem.



Figure 227: Lepterus repens



Figure 228: Sporobolus pyramidatus



Figure 229: Eragrostis amabilis

Lepturus sprouts can also appear red at the base though the color is often a bit more on the purple side, and is likely to be associated with die-off of early blades. In both of the plants below the narrow blade and erect growth pattern distinguish them from E. amabilis.



Figure 231: Lepturus repens

Older Lepturus (below left) have an erect growth pattern and long, narrow blades. E. amabilis (below right) tends to be prostrate with shorter blades and again is more prone to a red basal stem.



Figure 232: Lepturus repens

At larger sizes Lepturus often grows radially outward in a rosette pattern. Though this pattern is similar to that seen with E. amabilis, and the branching is also similar, Lepturus is generally larger, more dense, and again lacks the red stems found with E. amabilis.



Figure 234: Lepturus repens

Figure 235: Eragrostis amabilis

Mature Lepturus bunches have a large number of round, segmented stems. The mature blades are long and narrow, with fine striations and minute teeth in the margin. The teeth are visible in the photo below right, on the lower margin of the upper blade.



Figure 236: Lepturus repens

Figure 237: Lepturus repens

Poa annua

Bluegrass

Poa annua is a seasonal plant usually first occurring in October or November and persisting into the spring. It tends to mature somewhat more slowly than other non-native grasses but more quickly, and at smaller sizes, then Polypogon.



Figure 238: Poa annua

In its earliest stages Poa annua develops long narrow ascending blades that are usually somewhat curled. In sandy soil these sprouts usually occur far enough below the surface that blades from the same sprout appear like separate plants. At this stage the basic morphology is similar to E. paupera. Note in the photo below right that the older leaves have begun to take on both a curved and curled aspect.



Figure 239: Poa annua

Figure 240: Poa annua

Small sprouts bear a striking resemblance to E. paupera, including narrow curled leaves, and a tendency for early leaves to die back, leaving a sheath from which the plant continues to grow. At this early stage Poa annua leaves are already softer and more flexible, with a tendency towards S-curved blades, compared to the single curvature and stiffer blades of E. paupera.



Figure 242: Eragrostis paupera

In the photo below both E. paupera (left) and Poa (right) have narrow curled leaves, and similar branching structure. Plants at this stage are difficult to identify without side-by-side comparison, but E. paupera is generally much smaller at this stage as shown in the photo. It is often useful to have a good knowledge of plant distribution to limit the need to separate these two species. E. paupera is mostly restricted to the runway, although it is being out-planted in other areas including camp, where Poa annua is also found.



Figure 243: Eragrostis paupera (left) and Poa annua (right)

At later stages Poa annua takes on a dense clumping aspect and tends to be dark green. E. paupera, by contrast, takes on a linear radiating aspect and tends to be yellowish green.



Figure 244: Poa annua

Figure 245: Eragrostis paupera

Poa annua is also very similar to Polypogon interruptus. Polypogon typically has more slender blades and matures much more slowly. In the photo below left, 3 Poa are joined by a single Polypogon (rightmost plant). In the photo below right Poa is on the left. Note that all of the Poa are producing seed, while the Polypogon are not. Poa is fairly common on the trail from the main house to the beach and in Road to Runway RA, where Polypogon is absent, so this is a good place to get a feel for Poa.



Figure 246: Poa annua (3 plants on left) and Polypogon interruptus (right) Figure 247: Poa annua (left), Polypogon interruptus (right)

Polypogon interruptus Ditch Polypogon

Polypogon is a seasonal grass first occurring in November or December. It resembles Poa annua, also seasonal, especially when it is small, so it is useful to study both of them prior to their appearance in the fall. Polypogon is fairly widespread and can be found in the Poles, Mea Mea, and No Man's Land RAs.



Figure 248: Polypogon interruptus, Ditch Polypogon

Polypogon sprouts tend to have very long, slender blades, often germinating from fairly deep in sandy soil. Blades from one plant may appear like individual plants as they breach the soil surface.



Figure 250: Polypogon interruptus sprout

At small sizes Polypogon is often very difficult to distinguish from Poa annua. In both photos below Polypogon is on the right. In plants of similar size Polypogon has narrower blades but is otherwise very similar. Polypogon matures much more slowly than Poa annua and at a larger size. Note that in both photos below the Poa annua is seeding.



Figure 251: Poa annua (left), Polypogon interruptus (right)

Figure 252: Poa annua (left), Polypogon interruptus (right)

In larger plants Polypogon occurs as clumps of long, slender, mostly unbranched blades. The blades are soft, and usually fairly light green, especially when growing in shade. Polypogon reaches much larger sizes prior to seeding than Poa annua, and also take a fairly long time to seed, so when it is regularly treated it is uncommon to encounter mature plants. When growing in open sandy areas the blades often branch below the surface, as in the photo below left.



Figure 253: Polypogon interruptus

Figure 254: Polypogon interruptus

Polypogon can also be a very pale green, usually when growing in shaded conditions. These pale blades will often show distinct striations, similar to Setaria though of course Polypogon blades are long and narrow compared to Setaria.



Figure 255: Polypogon interruptus

Figure 256: Polypogon interruptus

Setaria verticillata

Bristly Foxtail

Setaria is a widespread non-native grass on Kure, somewhat preferring open areas, and one of the few plants that seems to tolerate growing under Heliotropium. It is characterized by broad, pale blades, and though the blades have a central keel like Cenchrus and Eleusine, the pale blade coloration makes it less easy to see.



Figure 257: Setaria verticillata

Setaria cotyledons are long and slender, with very little variation in width from near the base to near the tip. Subsequent blades are wide and tapered. On average Setaria is a paler green than Cenchrus, Eleusine indica, and Dactyloctenium aegyptium.



Figure 258: Setaria verticillata

Figure 259: Setaria verticillata

Setaria blades often show distinct striation. Though other grasses also have some striation, the broad width of the pale stripes make Setaria tend towards a much paler overall blade color. These striations somewhat mask the keel, which is visible on close inspection. The photo below right is a very reddish plant but is still readily identified as Setaria based on the relative length and width of the blades. Setaria is probably most similar to Dactyloctenium aegyptium in blade shape and overall appearance but they can be distinguished at all sizes. See the Dactyloctenium section for a comparison of the two plants.


Figure 260: Setaria verticillata

Figure 261: Setaria verticillata

Sporobolus pyramidatus

Dropseed

Sporobolus is a perennial grass colonizing open areas and hard substrates. There is some die-back of older plants in the winter. It is characterized by broad tapering blades, and a relatively closed seed head on a long stalk. It is abundant on the runway, and common on the roads and in other open sandy areas.



Figure 262: Sporobolus pyramidatus

Sporobolus cotyledons are relatively long and narrow, the second and following blades are generally broad and tapering. At this stage it is very small, which can be used to distinguish it from other broad bladed grasses such as Setaria.



Figure 263: Sporobolus pyramidatus



Figure 264: Sporobolus pyramidatus

Sporobolus continues to produce short, broad, highly tapered blades, with new stems radiating out from the base. The leaf shape and size is sufficient to distinguish it from all other grasses on Kure.



Figure 265: Sporobolus pyramidatus

Figure 266: Sporobolus pyramidatus

Description: Low, tufted perennial. Culms numerous, often spreading at base, glabrous, mostly 10-50 cm tall. Sheaths glabrous or with a few hairs on the upper margins. Ligule a fringe of hairs on a membranous collar, 0.5-0.8 mm long. Blades flat, 3-12 (-20) cm long and mostly 2-4 mm broad, usually ciliate on lower margins and sparsely hispid on adaxial surface. Panicles open, more or less pyramidal, mostly 3-15 (-18) cm long and 2-5 cm broad at base, the lower and middle branches in whorls and bare of spikelets on the lower 1/3-1/2. Spikelets 1.5-2.0 mm long, the lateral ones on very

short pedicels. Glumes very unequal, thin, acute, the first 0.3-0.8 mm long, the second as long as the lemma. Lemma acute, glabrous or scabrous. Palea hyaline, slightly shorter than the lemma. Grain broadly oblong, flattened laterally, usually 0.6-0.9 mm long, pale orange, the pericarp finely striate (Howard, 1979; pp. 73-74).

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