# THE PANICEAE (GRAMINEAE) OF FORMOSA[1]

by

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This is a taxonomic account of the Formosan millet tribe, *Paniceae*. A total of 22 genera, 68 species and 12 varieties are recognized in this article. A tropical genus, *Ottochloa*, and five naturalized species, namely *Axonopus compressa*, *Paspalum urvillei*, *Pennisetum purpureum*, *Rhynchelytrum repens* and *Setaria pallidefusca* are newly recorded. An attempt is made to summarize our present knowledge of this tribe.

An analytical key to the genera and key to the species for each genus are given. Brief characteristics together with habitats, economic values, flowering time and localities are also stated. Localities are represented by County (Hsien) beginning from the north of Taiwan and going to the south then up the east coast. (see Map of Formosa).

Chromosome numbers and common English names are listed under each species if available. An attempt has been made to give a Chinese name for each species. Some of them are newly suggested by the present writer. Full enumerations are omitted except the name appearing in Masamune's "SHORT FLORA OF FORMOSA" (1936).

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## **Paniceae** R. Brown 黍族

Spikelets 2-flowered; florets disarticulating below the glumes; the upper floret perfect, the lower staminate or neuter; glumes thinner than the upper lemma, the lower usually smaller or wanting, the upper lemma and palea firmer or coriaceous; inflorescence an open panicle, contracted spike-like panicle or arranged in racemose, digitate or solitary raceme. (Fig 1; Fig 2)

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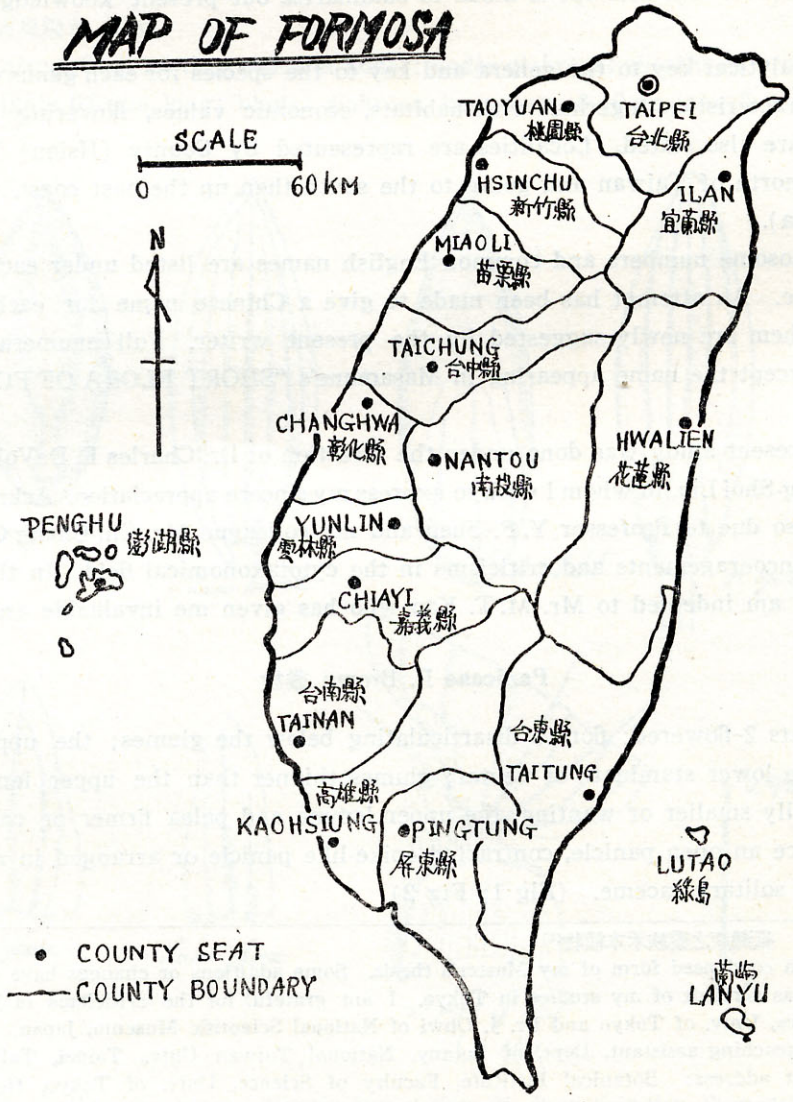
Stigmas 2, feathery, styles reduced or well developed in *Spinifex, Thuarea;* stamens 3; lodicules 2, truncate at the apex and narrowed at base, weakly 3–veined to numerous-veined, flat or plicated at margin; caryopsis obovate or elliptical, hilium basal, punctiform; embryo half the length of the grain.

Chromosomes small, basic number of 9 or 10, rarely 7(in *Brachiaria reptans*); embryo panicoid type; leaf-blades with panicoid anatomy; silica-cells nodular, dumb-bell-shaped or cross-shaped; micro-hairs 2–celled, filiform; first foliage leaf of the seedling flat and horizontal.



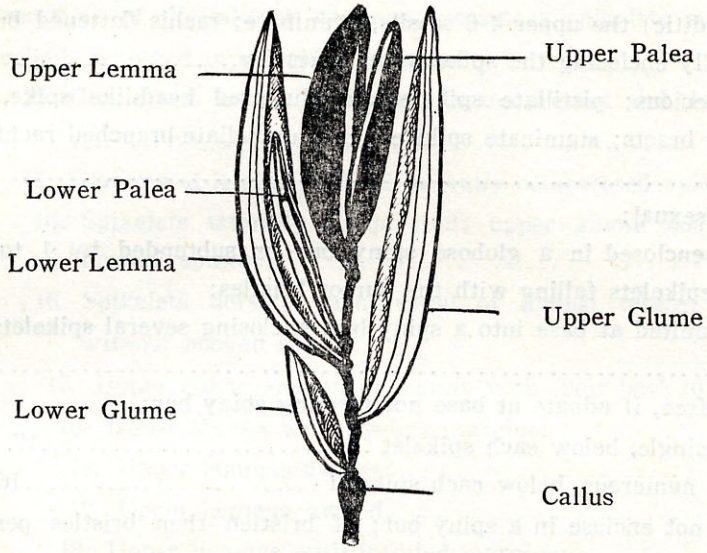



Fig 1. Diagram of Spiklet

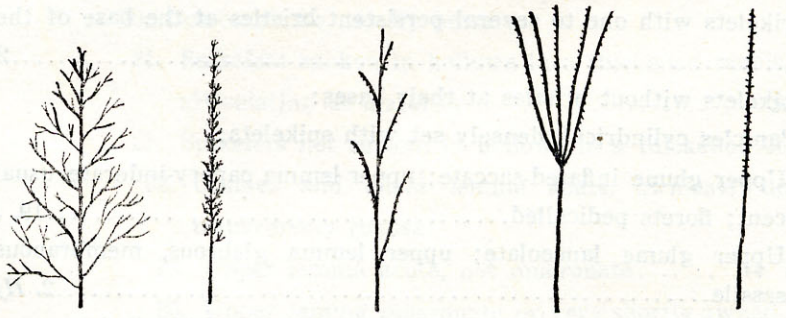



Fig 2. Diagam of Inflorescence

The millet tribe is one of the largest tribes of the grass family. It has been accepted as a natural group having well defined characteristics. There are more than 80 genera and about 1,500 species distributed in the tropics and subtropics of both hemispheres. They are abundant especially in those regions that have a warm climate and have a heavy annual rainfall. There is a zone of maximum concentration of them in the north-eastern part of South America.

## KEY TO THE GENERA OF TRIBE PANICEAE

1. Spikelets mostly unisexual; plants littoral:
2. Plants monoecious; spikelets in a simple spike, the lower 1 or 2 pistillate (or

hermaphroditic) the upper 4–6 sessile, staminate; rachis flattened but broadened and partially enclosing the spikelets at maturity.....22. *Thuarea*

2. Plants dioecious; pistillate spikelets in clustered head-like spike, with spiny subtending bracts; staminate spikelets in a umbellate-branched rachis .....21. *Spinifex*

1. Spikelets bisexual:

3. Spikelets enclosed in a globose spiny bur or subtended by 1 to many free bristles; spikelets falling with the bur or bristles:

4. Bristles united at base into a spiny bur, enclosing several spikelets .....4. *Cenchrus*

4. Bristles free, if adnate at base not forming spiny bur:

5. Bristle single, below each spikelet .....17. *Pseudoraphis*

5. Bristles numerous, below each spikelet .....16. *Pennisetum*

3. Spikelets not enclose in a spiny bur; if bristled then bristles persistent, and spikelets deciduous:

6. Inflorescence of loose, open or densely contracted spike-like panicles; spikelets usually distinctly pedicelled, not arranged in one-sided racemes:

7. Spikelets with one to several persistent bristles at the base of the spikelet .....20. *Setaria*

7. Spikelets without bristles at their bases:

8. Panicles cylindrical, densely set with spikelets:

9. Upper glume inflated-saccate; upper lemma papery-indurate, usually pubescent; florets pedicelled.....19. *Sacciolepis*

9. Upper glume lanceolate; upper lemma glabrous, membranous; florets sessile.....2. *Hymenachne*

8. Panicles loosely opened, usually sparingly set with spikelets:

10. Upper glume and lower lemma awned or pointed, at least the latter awned from the sinus:

11. Upper glume and lower lemma not peaked, strongly 5–7 veined; lower lemma awned from the sinus .....**Melinis*

11. Upper glume and lower lemma peaked, long ciliate, awned from the sinus .....18. *Rynchelytrum*

10. Upper glume and lower lemma entire at apex:

12. Spikelets truncate, gibbose, strongly and laterally compressed .....5. *Cyrtococcum*

12. Spikelets not gibbose, nor truncate, dorsally compressed:

13. Upper florets with scars at base.....10. *Ichnanthus*

13. Upper florets without lateral appendages at base:

14. Upper glume as long as the spikelet.....13. *Panicum*

14. Upper glume up to 1/2 as long as the spikelet .....12. *Ottochloa*

6. Inflorescence of digitate or racemose racemes; spikelets sessile or short pedicelled, arranged in one-sided racemes:
15. Glume and lemma with laterally compressed and thickened apices ..... *Acroceras*
15. Glume and lemma without laterally compressed apices:
16. Spikelets laterally compressed; upper glume boat-shaped, with hooked spines..... *Pseudechinolaena*
16. Spikelets dorsally compressed or almost terete; upper glume without hooked spines:
17. Upper glume and upper lemma with their back to the floral axis:
18. Upper lemma with hyaline margins:
19. Upper lemmas awnless..... 6. *Digitaria*
19. Upper lemmas awned..... 1. *Alloteropsis*
18. Upper lemmas with inrolled margins:
20. Lower glume usually wanting, if present, only in some of the spikelets..... 15. *Paspalum*
20. Lower glume usually present:
21. Spikelets sunken in hollows in a thickened rachis, the latter articulating at maturity ..... *Stenotaphrum*
21. Spikelets not sunken in hollows in a thickened corky rachis:
22. Glumes and lower lemma acute, awnless; upper florets transversely rugose:
23. Upper lemma acute, not mucronate..... 14. *Paspalidium*
23. Upper lemma mucronate or very shortly awned... *Urochloa*
22. Glumes and lower lemma acuminate or awned; upper lemma smooth:
24. Blades lanceolate to ovate, broad and herbaceous; culms partly creeping..... 11. *Oplismenus*
24. Blades linear, narrow; culms or suberect.... 7. *Echinochloa*
17. Lower glume and lower lemma with their back to the floral axis:
25. Base of spikelets thickened into a callus; lower glume wanting..... 8. *Eriochloa*
25. Base of spikelets nor thickened into a callus:
26. Lower glume present..... 3. *Brachiaria*
26. Lower glume absent..... 2. *Axonopus*

* Never recorded from Formosa, but maybe expected to be found in Formosa

### 1. **Alloteropsis** J. S. Presl ex C. B. Presl 毛穎草屬

1-1. ***Alloteropsis semialata*** (R. Br) Hitchc. (*Axonopus semialata* (R. Br.) Hook. f.)
毛穎草 N=9 (Chen, Formosa)

Tufted with the woolly remains of old leaf-sheaths, eventually splitting into fibers. Racemes mostly 2, sometimes 3-4; upper glume widely winged, awn-tipped, densely ciliate, the hairs appressed at first, finally widely spreading along the margins.

Growing on dry open grassy slopes, usually on the graves near hills—Locally in Hsinchu, Miaoli, and Tainan.—I-VII.—widely distributed in S. China, the Philippines to Burma, India, Ceylon to Australia and tropical Africa.

### 2. **Axonopus** P. Beauv. 地毯草屬

2-1. ***Axonopus compressus*** (Sw.) P. Beauv.
地毯草 2N=40; 60 Carpet Grass.

The creeping stolons rooting at the nodes and forming a dense mat. Blades ciliate on margins, soft and suddenly obtuse at the apex; racemes 2-4 partially enclosed in the uppermost sheath; spikelets extremely dorsally compressed.

This is an introduced grass and is naturalized in Tainan (29, VI. 1960 Hsu 609; IX. 1961 Chen). It is native to tropical Americal. It is said to make good pasture and is frequently used as a lawn grass.

### 3. **Brachiaria** (Trin.) Griseb. 臂形草屬

1. A tall grass; culms 5-8 mm in diameter, nodes villous; racemes more than 10 cm. long.....1. *B. mutica*
1. A slender grass; culms less than 3 mm in diameter; racemes less than 5 cm long:
2. Spikelets more than 3.5 mm long, narrowly elliptical .....3. *B. subquadripara*
2. Spikelets about 2 mm long, ovate:
3. Spikelets paired, lower glume truncate, about 1/4 as long as the spikelet; whole plant glabrous except hispid leaf bases.....2. *B. reptans*
3. Spikelets solitary, lower glume obtuse, about half as long as the spikelet: whole plant covered with short soft hairs.....4. *B. villosa*

3-1. ***Brachiaria mutica*** (Forsk.) Stapf (*B. purpurascens* (Raddi) Henr.)
巴拉草 (Hsu) 2N=36 (Nath & Swamiratham, 1957) Para Grass.

Widely creeping stout grass usually forming a giant straggling mat due to its wonderful vegetative propagation; spikelets about 3 mm long; lower glume 1/3 as long as the spikelet.

It was probably introduced and has become naturalized along borders of canals, marshes and swamps or floating along brackish ditches. It is one of the most excellent grasses for fodder in marshy or wet soils—Locally in Taipei and Kaohsiung.—XI-XII.—Distributed in tropical America and tropical Africa now introduced in most tropical countries.

3-2. ***Bracharia reptans*** (L.) C. A. Gardn. et C. E. Hubb. (*Panicum reptans* L.)
臂形草 (Hsu) N=7 (Chen, Formosa)

A small grass with 10–30 cm ascending culms; margins of leaf blades usually hispid; racemes 0.5–3 cm long; spikelets glabrous.

Common in cultivated fields, but only found south of Yunlin County. It can endure dry situations and provides a good hay—Locally in Yunlin, Chiayi, Tainan Pingtung and Taitung.—VIII-IX—Widely distributed in tropics.

3-3. ***Brachiaria subquadripara*** (Trin.) Hitchc. (*B. distachon* auctt) in part non L.)
四生臂形草 N=36 (Chen, Formosa)

Culms straggling or suberect, rooting at the nodes; racemes 4–6, distant; spikelets sharply acute, 3.5–4 mm long; lower glume 1/2 as long as the spikelet; lower palea reduced or well developed.

This is a common grass throughout the Island, growing well in sandy places. It becomes a troublesome weed in cultivated fields, but it makes a good pasture.—Locally in Taipei, Hsinchu, Miaoli, Taichung, Yunlin, Nantou, Pingtung, Taitung and Tainan.—VI-XII.—Widely distributed in S. China, the Philippines, Indo-China, Malaysia to Ceylon and India.

3-4. ***Brachiaria villosa*** (Lamk.) A. Camus (*Panicum villosum* Lamk.)
毛臂形草 N=18 (Chen, Formosa)

A slender grass with soft hairy leaves; margins of blades undulate; racemes 4–6 cm long; spikelets usually densely pubescent, but sometimes nearly glabrous, easily falling off from the bristled pedicel.

Growing on the rocky hills at low altitudes, never found on the plains.—Locally in Taipei, Hsinchu, Taichung, Nantou, Pingtung, Taitung and Lanyu.—V-X.—Distributed in S. China, Indo-China, Burma, India, Ceylon to tropical Africa.

## 4. **Cenchrus** L. 刺穀草屬 (Hsu)

4-1. ***Cenchrus calyculatus*** Cavan
刺穀草 N=34 (Chen, Formosa). Bur Grass.

Culms somewhat compressed; sheath margins usually pubescent; raceme single, long exserted; spikelets enclosed in a spiny bur.

A troublesome weed occurring generally in open sandy fields near seashore. Common in the southern part of Formosa. Before the spiny burs are formed, this is a good forage grass—locally in Taipei, Miaoli, Yunlin, Tainan, Pingtung, Taitung, Lanyu.—Distributed in tropics of both Hemispheres.

## 5. **Cyrtococcum** Stapf 弓果草屬

1. Spikelets less than 1.4 mm long, usually dark purple in color; blades and panicles very large.....1. *C. accrescens*

1. Spikelets more than 1.5 mm long, green with tinge of purple; panicles opened or contracted.....2. *C. patens*

5-1. ***Cyrtococcum accrescens*** (Trin.) Stapf (*C. patens var. latifolium* (Honda) Ohwi)

散穗弓果草 N=18 (Chen, Formosa)

A shade-loving grass of more than 50 cm tall; blades pubescent; panicles diffuse. Abundant in thickets, hedges and secondary forests of low to medium altitudes as an undergrowth, usually forming a pure stand. It is eaten by cattle.—Locally in Taipei, Hsinchu, Miaoli, Taichung, Nantou, Tainan, Kaohsiung, Pingtung, Taitung and Hwalien.—VII-X.—Distributed in Pacific Islands, S. China, Indo-China, India and Malaysia.

5-2. ***Cyrtococcum patens*** (L.) A. Camus

弓果草

Much smaller than *C. accrescens;* panicle contracted, less than 12 cm long, often reduced to only a few branches.

Common on shady hillsides throughout the Island, also forming large pure stands —locally in Taipei, Taoyuen, Hsinchu, Miaoli, Taichung, Changhwa, Nantou, Pingtung, Taitung, Hwalien and Ilan.—VII-XII—Distributed in Pacific Islands, S. China, Indo-China, India and Malaysia.

## 6. **Digitaria** Heist. ex Fabricius 馬唐屬

(*Syntherisma* Walter)

1. Spikelets 2.5-4 mm long, acuminate, narrowly lanceolate; pedicels winged, usually serrate:
2. Rachis triangular, shining; spikelets dimorphic, sessiled glabrous, pedicelled villous; lower lemma with convex stout veins (veins much broader than the space between veins).....2. *D. bicornis*
2. Rachis flat; spikelets monomorphic; lower lemma with fine veins:
3. Racemes closely contracted; sheaths glabrous; spikelets about 2.5 mm long .....5. *D. henryi*
3. Racemes partially contracted or spreading:
4. Margins of rachis-wing entire or serrulate; racemes 2-4, slender:
5. Leaves glabrous, base of blades scattered with long hairs; growing in shady soils.....13. *D. timorensis*
5. Leaves densely hirsute; growing on rocky cliffs.....14. *D. timorensis var.*
4. Margins of rachis-wing serrate:
6. Lower glume wanting; upper glumes less than 1/3 as long as the spikelet: ..... 10. *D. microbachne*
6. Lower glume small but distinct, ovate; upper glume more than 1/2 as long as the spikelet:

7. Plant hairy; nodes bearded; upper glume about 3/4 as long as the spikelet ..... 12. *D. sericea*
7. Plant glabrous; nodes glabrous; upper glume 1/2 as long as the spikelet or longer:
8. Spikelets 3–3.5 mm long; interveins of lower lemma broader at middle ..... 11. *D. sanguinalis*
8. Spikelets 3 mm long; interveins of lower lemma evenly distributed ..... 1. *D. adscendens*

1. Spikelets up to 2.2 mm long, acute, elliptical or ovate; pedicels terete, smooth:
9. Upper florets pale at maturity; blades less than 10 cm long; pedicels shorter than the spikelet:
10. Culms stoloniferous; sheaths more or less pubescent, at least on lower ones; spikelets 1.2–1.5 mm long, sparingly pubescent; racemes 2–6 cm long ..... 8. *D. longiflora*
10. Culms erect or decumbent; both lower blades and sheaths villous; spikelets 1.5–2.2 mm long:
11. Racemes 3–5 cm long; blades 2–4 cm long ..... 4. *D. hayatae*
11. Racemes 5–10 cm long; blades 7–10 cm long ..... 9. *D. magna*
9. Upper florets brown in color at maturity:
12. Spikelets distinctly shorter than the pedicel; racemes 0.3–0.4 mm wide; spikelets 1.2–1.5 mm long; upper florets light brown in color ..... 7. *D. leptalea var.*
12. Spikelets as long or longer than the pedicel; racemes more than 0.5 wide; upper lemmas dark brown:
13. Upper glume 1/4–1/2 as long as the spikelet—3. *D. fauriei*
13. Upper glume nearly as long as the spikelet:
14. Spikelets about 1.8 mm long; lower glume wanting ... 15. *D. violascens*
14. Spikelets more than 2 mm long; lower glume if present, membranous ..... 6. *D. ischaemum*

6-1. ***Digitaria adscendens*** (HBK) Henr. (*Syntherisma sanguinalis* auct. Japan)
假馬唐 (Hsu) N=27 (Chen, Formosa)

Culms decumbent, rooting at lower nodes; sheaths usually papillose-pilose, with several long hairs at mouth; racemes 3–8; rachis 0.6–1 mm wide.

One of the most common grasses found throughout the Island, usually grows on roadsides, open fields, gardens and waste places. On waste hillsides and fields, it forms rather wide areas of pure stand. It is one of the most excellent and abundent native-growing forage grasses—Locally in Taipei, Taoyuen, Miaoli, Taichung, Nautou, Yunlin, Chiayi, Tainan, Kaohsiung Pingtung, Taitung, Hwalien, Ilan, Lutao—V-XII.—Distributed in tropics and warm temperate regions.

6-2. ***Digitaria bicornis*** (Lamk.) Roem. et Schult. (*D. shimadana* Ohwi)

粗穗馬唐 (Hsu) N=18 (Chen, Formosa)

Culms creeping; racemes 2-3, rachis stout and stiff, more than 15 cm long.

Growing on waste sandy soils. Before the raceme forms, it is eaten by cattle—Locally in Hsinchu, Tainan—VII-IX—Distributed in S. China, the Philippines, Indo-China, India to Ceylon.

6-3. ***Digitaria fauriei*** Ohwi

佛歐里馬唐 (Hsu)

Culms ascending; blades sparingly pilose or glabrous; racemes weak, 2-3

A rare species, found at Tamsui,—X-XI.—Endemic.

6-4. ***Digitaria hayatae*** Honda

絨馬唐 (Hsu)

Culms stout, suberect; sheaths and blades villous; racemes 2-3, 5-7 cm long.

Growing only on dry sandy fields—Locally in Yunlin.—III—X—Endemic.

6-5. ***Digitaria henryi*** *Rendle* (*Syntherisma sasakii* Honda)

亨利馬唐 (Hsu) N=18. (Chen, Formosa)

Sheaths glabrous; spikelets about 2.5 mm long; racemes contracted.

Growing along roadsides, moist soils near the seashore.—Locally in Taipei, Taoyuen, Hsinchu, Miaoli, Taichung, Nantou, Kaohsiung, Pingtung, Taitung, Ilan, Lutao, and Lanyu.—VIII-I.—S. China to Indo-China.

6-6. ***Digitaria ischaemum*** (Schreb.) Schreb. ex Muhl.

止血馬唐 N=36 (Brown, 1951)

Culms decumbent; sheaths soft hairy or glabrous; racemes 2-4, 2-8 cm long; rachis 0.8-1.2 mm broad, apex rounded; pedicels flat.

Rather rare, found in N. E. Formosa and limited to mountainous regions.—Distributed in temperate regions.

6-7. ***Digitaria leptalea*** Ohwi *var.* ***recticulmis*** Ohwi

叢立馬唐 (Hsu) N=9 (Chen, Formosa)

Culms tufted at base, then hanging down and ascending; sheaths pubescent; racemes 2-3, 5-7 cm long; rachis 0.3-0.4 mm wide.

Growing on sandy slopes or hillsides.—Taipei, Taoyuen, Taichung, Pingtung.—III-XI.—Endemic.

6-8. ***Digitaria longiflora*** (Retz.) Pers. (*Panicum parvulum* Trin)

鐵線草 (Hsu) N=9 (Chen, Formosa)

Stoloniferous, flowering culms ascending; racemes 2-4, 3-8 cm long; upper floret pale in color.

Abundant in dry poor soils on roadsides, along bank of irrigation ditches, often growing in association with *Cynodon dactylon.* It is an excellent sandbinding grass, but becomes a very bad weed due to its wonderful vegetative reproduction in cultivated fields.—Locally in Taipei, Taoyuen, Hsinchu, Miaoli, Taichung, Yunlin,

Nantou, Tainan, Pingtung, Hwalien, Ilan, Lutao.—V-XI.—Distributed in tropics of the Old World and S. America.

6-9. ***Digitaria magna*** (Honda) Tsuyama

大絨馬唐 (Hsu) N=18 (Chen, Formosa)

Culms stout, suberect; sheaths and blades villous-tomentose; racemes 3-4, 6-9 cm long; spikelets silvery shining.

Growing in sandy soils near seashore, usually found with bushes.—Locally in Taoyuen, Miaoli, Tainan, Taitung.—VI-X.—Endemic.

6-10. ***Digitaria microbachne*** (Presl) Henr. (*Syntherisma sanguinalis* L. var. evalvula Honda)

大馬唐 (Hsu) N=36 (Chen, Formosa)

Culms as much as 1 meter or more long; sheaths papillose-pilose, stinging to touch; racemes 6-15, subdigitate, 7-14 cm long.

A large grass abundant throughout the Island. It is a good fodder grass growing on sunny soils.—Locally in Taipei, Taoyuen, Miaoli, Yunlin, Nantou, Chiayi, Tainan, Kaohsiung, Pingtung, Taitung.—V-XII.—Distributed in tropical Asia, including Malaysia and Micronesia.

6-11. ***Digitaria sanguinalis*** (L.) Scop.

馬唐 N=36 (Krishnaswamy) Crabgrass.

Culms ascending; sheaths usually hispid; marginal veins of lower lemmas scabrous.

Not so common as *D. adscendens*. Originally from Europe. It is said that it is a excellent fodder grass.—Distributed in warm and temperate regions.

6-12. ***Digitaria sericea*** (Honda) Honda

絹毛馬唐 (Hsu) N=27 (Chen, Formosa)

Culms suberect; leaves villous; racemes 3-5, contracted; spikelets pilose to villous.

Growing only in littoral regions, not abundant.—locally in Taipei, Hsinchu Taichung, Taitung—VII-X.—Endemic.

6-13. ***Digitaria timorensis*** (Kunth) Balansa (*D. chinensis* Hornem.; *D. formosana* Rendle)

小馬唐 (Hsu) N=9 (Chen, Formosa)

Culms slender, less than 25 cm high; sheaths and blades glabrous; racemes 2-3, 4-9 cm long.

It is common in rather shaded places around villages throughout the Island.—Locally in Taipei, Miaoli, Chiayi, Tainan, Pingtung, Taitung, Hwalien.—V.-IX.—Distributed in S. Japan, China, Indo-China to Micronesia.

6-14. ***Digitaria timorensis*** (Kunth) Balansa *var.* ***hirsuta*** (Honda) Hsu, comb. nov. based on *D. chinensis* Hornem *var. hirsuta* Ohwi.

毛小馬唐 (Hsu) N=9 (Chen, Formosa)

Rather rare. Growing on sunny hillsides near coastal cliffs. Differs from the species in having hirsute blades and sheaths.—Locally in Taipei, Nantou, Pingtung, Taitung, Ilan.—Formosa and Liukyu, Malaya.

6-15. ***Digitaria violascens*** Link.

紫果馬唐 (Hsu) N=18 (Chen, Formosa)

Culms tufted, 20–50 cm tall; leaves mostly radical; racemes 2–7, 4–14 cm long; upper florets purplish when mature.

Abundant here and there in open soils. It is doubtless eaten by all grazing animals.—Locally in Taipei, Taoyuen, Hsinchu, Yunlin. Nantou, Chiayi, Tainan, Kaohsiung, Pingtung, Taitung, Hwalien, Ilan, Lanyu.—I-XII—Distributed in tropical regions of both Hemispheres.

## 7. **Echinochloa** P. Beauv. 稗屬

1. Racemes approximate, the upper shorter than the lower; spikelets irregularly crowded; lower glume 1/3-2/5 as long as the spikelet, if 1/2 then spikelets 4–5 mm long:
   2. Spikelets broadly ovate to globose; racemes thickened, sometimes incurved; grains persistant.....5. *E. utilis*
   2. Spikelets ovate to elliptical; grains deciduous.....(*E. crus-galli*)
      3. Lower lemma not polished; blades 2–10 mm wide; culm bases and spikelets usually brownish purple in color .....4. *var. praticola*
      3. Lower lemma usually coriaceous and shining; culms and spikelets greenish:
         4. Spikelets 3–4 mm long; lower glume 2/5 as long as the spikelet .....2. *var. formosensis*
         4. Spikelet about 5 mm long; lower glume 1/2-3/5 as long as the spikelet .....3. *var. orizicola*
1. Racemes distant, nearly of equal length; spikelets in 4-rows; lower glume 1/2 as long as the spikelet; leaf margins not thicken into a white band..1. *E. colonum*

7-1. ***Echinochloa colonum*** (L.) Link

芒稷 N=27 (Chen, Formosa) Wild Millet.

Culms erect, 20–40 cm long; racemes pointing upward, inclined; spikelets 2–2.5mm long.

Growing in wet waste places, or roadsides. Common along edges of paddy fields. The grains are eaten when needed. It is a good pasture grass for cattle.—Locally in Taipei, Miaoli, Taichung, Tainan, Chiayi, Kaohsiung, Pingtung, Penghu aand Lutao.—VI-IX—Distributed in tropical and subtropical regions of both Hemispheres.

7-2. ***Echinochloa crus-galli*** (L.) Beauv. ***var. formosensis*** Ohwi

臺灣野稗 (Hsu) N=27 (Chen, Formosa)

Culms decumbent, 40–80cm high; racemes partially spreading; spikelets 3–4mmlong.

This is the most troublesome weed in the paddy fields. It grows together with

rice and is difficult to distinguish before flowering. But the white thickened band of the leaf margin never occurs in rice.—Locally in Taipei, Miaoli, Taichung, Pingtung, Taitung, Lutao.—V-XII.—Distributed in tropical Asia.

7-3. ***Echinochloa crus-galli*** (L.) Beauv. *var.* ***oryzicola*** Ohwi

水稗 (Hsu) N=27 (Chen, Formosa)

Culms erect, 50–90 cm high; racemes appressed; spikelets about 5 mm long.

This is also a common weed in paddy field. The grains are eaten by poor people and as bird food.—Locally in Taipei, Taoyuen, Hsinchu, Miaoli, Nantou, Taichung, Chiayi, Tainan, Pingtung, Taitung, Lanyu.—I-XII.—Distributed in Warm regions.

7-4. ***Echinochloa crus-galli*** (L.) Bearv. *var.* ***praticola*** Ohwi

細葉旱稗 (Hsu)

Culms 20–30 cm high, slender; racemes purplish; spikelets 2.5–3 mm long.

Common in sunny fields, roadsides. It can grow on dry soils. Possibly eaten by cattles.—Locally in Taipei, Miaoli.—III-XII.—Japan, Liukyu and Formosa.

7-5. ***Echinochloa utilis*** Ohwi et Yabuno (*E. frumentaces* auct. Japan, non Roxb.)

湖南稷子 N=36 (Hunter) Japanese Millet.

Culms stout, tufted; racemes usually incurved; spikelets globose, 2.5–3 mm long.

This was cultivated for its grain especially in the past. It also makes a food pasture.—Cultivated in China and Japan.

## 8. **Eriochloa** H. B. K. 野黍屬

1. Spikelets about 2.0 mm broad; pedicels villous; plant villous.....2. *E. villosa*
1. Spikelets 1 mm wide; pedicels scattered with several long hairs; plant usually glabrous..... 1. *E. procera*

8-1 ***Eriochloa procera*** (Retz), C. E. Hubb. (*E. ramosa* (Retz.) O. Ktze.)

紫野黍 (Hsu) N=18 (Chen, Formosa)

Culms tufted; blades 4–20 cm long, 2–8 mm wide; spikelets about 3 mm long; callus purplish.

Abundant in the southern part of the Island. Growing on open grounds, both in dry and swampy soils. It is a useful forage grass.—Locally in Chiayi, Tainan, Kaohsiung, Pingtung, Taitung, Hwalien, Lanyu.—IV-X-I.—Distributed in South-east Asia, Burma, India and also in tropical Africa.

8-2. ***Eriochloa villosa*** (Thunb.) Kunth

野黍 2N=54 (Tateoka, Japan)

Culms tufted; blades 10–25 cm long, 7–15 mm wide; spikelets about 4.5–5 mm callus yellow in color.

Not common. On hill slopes, ravines of mountains at low to medium altitudes.—Locally in Taipei, Miaoli, Nantou, Lanyu.—VII-X.—Distributed in Japan, China, Liukyu and Formosa.

### 9. **Hymenachne** P. Beauv. 膜稃草屬

9-1. ***Hymenachne pseudointerrupta*** C. Muell. (*H. amplexicaulis* auctt. Fl. As. non Nees)
膜稃草

Culms succulent, decumbent below, and rooting at the nodes; panicle spikelets, 15–30 cm long; spikelets glabrous, 5–6 mm long.

Aquatic grass, not common. Growing along ditches or floating on ponds and rooting in mud.—Locally in Taipei, Tainan, Kaohsiung, Pingtung.—VII-XI.—Distributed in S. China, Indo-China, India and Malaysia.

### 10. **Ichnanthus** P. Beauv. 距花黍屬

10-1. ***Ichnanthus vicinus*** (F. M. Bail.) Merr.
距花黍 N=20 (Chen, Formosa)

Culms weak, decumbent; blades thin, ovate to ovate-lanceolate, 3–8 cm long, 1–2.5 cm wide; spikelets 3.5–5 mm long; upper florets with two scars at base.

Abundant in thickets and secondary forests as an under-growth, often forming pure stands. Shade-loving—locally in Taipai, Miaoli, Taichung, Nantou, Tainan, Hwalien, Ilan, and Lanyu.—VII-X.—Distributed in S. China, Indo-China, India, Malaysia, the Philippines and Polynesia to Queensland.

### 11. **Oplismenus** P. Beauv. 求米草屬

1. Inflorescence of groups of fasciled spikelets alternate along the axis, rarely racemes 1.5 cm long ..... (*O. undulatifolius*)
2. Main axis of inflorescence papillose-villous; leaves hairy ..... 7. *var. undulatifolius*
2. Main axis of inflorescence not papillose-vilous; leaves nearly glabrous:
3. Rachis of racemes reduced; spikelets 1–3; blades 1–3 cm long ..... 6. *var. microphyllus*
3. Rachis of racemes up to 1.5 mm long; spikelets 3–30 per raceme; blades 3–7 cm long ..... 5. *var. japonicus*
1. Inflorescence racemose; rachis of raceme prolonged; lower racemes 2–5 cm long, rarely 0.7 cm long: ..... (*O. compositus*)
4. Spikelets 5 mm long; tip of the upper florets with an erect, short spine; blades 2–3.5 cm broad, less hairy ..... 4. *var. patens*
4. Spikelets 3–4 mm long; tip of the upper florets acute or mucronate, bending forwards; blades 0.5–2.4 cm broad:
5. Rachis with short hairs, not papillose-villous ..... 1. *var. compositus*
5. Rachis papillose-villous:
6. Racemes 1–3 cm long; spikelets densely crowded; blades less than 9 cm long, margins scabrous ..... 2. *var. intermedius*
6. Racemes 3–6 cm long; spikelets rather far apart on rachis; blades 10–16 cm long, margins hispid, at least at base ..... 3. *var. owatarii*

11-1. ***Oplismenus compositus*** (L.) P. Beauv. var. ***compositus*** (O. formosanus Honda)
竹葉草 N=36 (Chen, Formosa)

Culms decumbent at base and rooting from the lower nodes; racemes 6-10, 1.5-6 cm long; spikelets 3-3.5 mm long, glumes awned.

Abundant as an under-growth in thickets, secondary forest. It is a poor pasture grass and is a troublesome weed due to the awned spikelets which become attached to humans as well as animals.—Locally in Taipei, Taoyuen, Miaoli, Taichung, Nantou, Chiayi, Tainan, Kaohsiung, Pingtung, Taitung, Hwalien, Lutao, Lanyu.—I-XII.—Distributed in tropics.

11-2. ***Oplismenus compositus*** (L.) P. Beauv. ***var. intermedius*** (Honda) Ohwi (*O. burmanni* Beauv. *var. intermedius* Honda)
大屯竹葉草 (Hsu)

Differs from the species in having yellowish villous racemes which are 1-3 cm long. It has stout awns of 3-5 mm long and pubescent leaves.—Locally in Taipei, Taitung, Hwalien, Ilan, Lanyu.—V-XI.

11-3. ***Oplismenus compositus*** (L.) P. Beauv. var. ***owatarii*** (Honda) Ohwi (*O. owatarii* Honda)
粗毛竹葉草 (Hsu) N=36 (Chen, Formosa)

Differs from the species in having whitish villous racemes which are 3-6 cm long. It has 6-8 mm long awns and the blades are 10-16 cm long.

Not so common. Growing at medium altitudes under woods—Locally in Taipei, Hsinchu, Miaoli Taichung, Nantou, Hwalien.—VIII-II.—S.China, Indo-China and Formosa.

11-4. ***Oplismenus compositus*** (L.) P. Beauv. *var.* ***patans*** (Honda) Ohwi (*O. polliniae-folius* Honda)
大竹葉草 (Hsu)

Differs from the species in being a robust plant which is nearly glabous.—Locally in Taipei, Nantou, Lanyu.—XI-V.—Distributed in Japan, Liukyu and Formosa.

11-5. ***Oplismenus undulatifolius*** (Ard.) P. Beauv. *var.* ***japonicus*** (Steud.) Koidz.
求米草 (O. psilostachys Honda)

The culms and leaves of this variety are less hairy The main axis of the inflorescence is also nearly glabrous.

Growing at low to medium altitudes—Locally in Taipei, Hsinchu, Taichung, Nantou, Chiayi. Taitung, Hwalien, Taitung, Ilan.—VII-XO-II.—Distributed in Japan, Korea, China and Micronesia.

11-6. ***Oplismenus undulatifolius*** (Ard.) P. Beauv. *var.* ***microphgllus*** (Honda) Ohwi
小求米草 (Hsu)

A dwarf form and much less hairy. The inflorescence with only a few spikelets; blades 1-3 cm long.

Growing at medium altitudes.—Locally in Nantou.—X-XI.—China, Japan to Micronesia

11-7. ***Oplismenus undulatifolius*** (Ard.) P. Beauv. *var.* ***undulatifolius***

毛求米草 (Hsu) 2N=54 (Tateoka, Japan)

This species is characterized by its pilose sheaths and by having a hairy main axis. The inflorescence consists of racemes on the lower parts, which become progressively shorter upwards and finally into twos or threes on the upper part of the main axis.

Rare in Formosa, found only at Mt. Ta-tun.—XI.—Distributed in Southern Europe and temperate regions of Japan, China and India.

## 12. **Ottochloa** Dandy 奧國草屬

12-1. ***Ottochloa nodosa*** (Kunth) Dandy (Fig. 3)

新店奧國草 (Hsu)

Culms straggling, rooting at lower nodes; nodes glabrous; sheaths glabrous except margins; ligule 0.5 mm long; blades glabrous, lanceolate, 6–10 cm long, 5–8 mm wide;

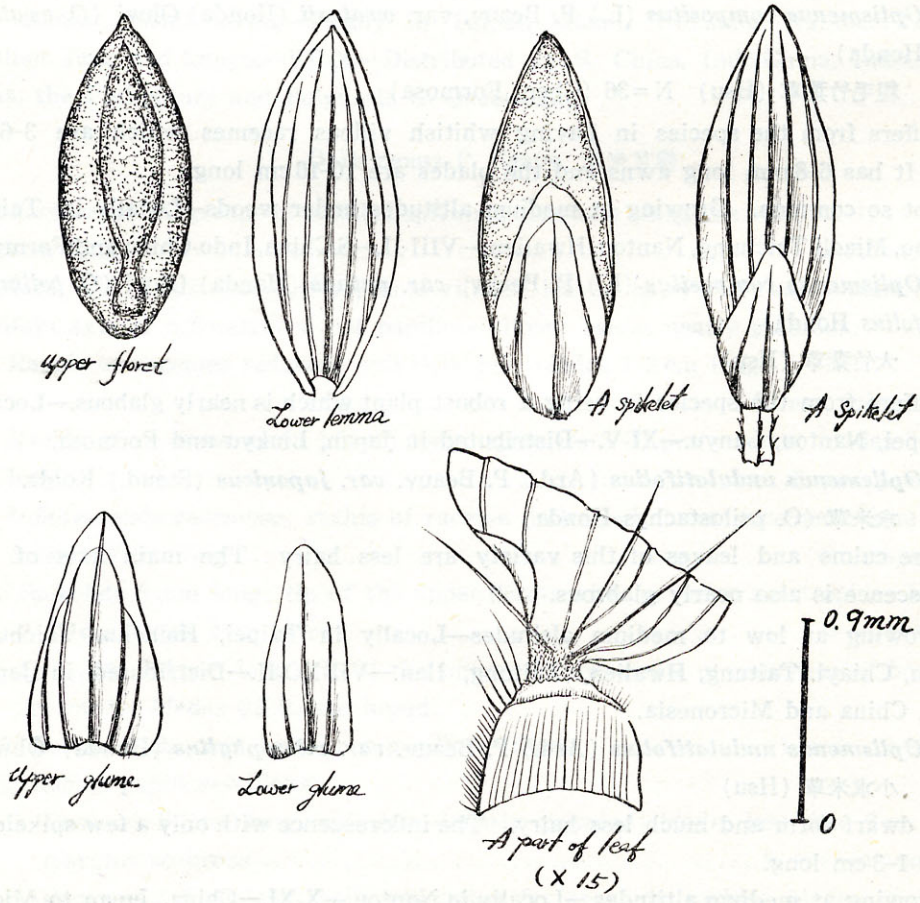



Fig 3. Ottochloa nodosa (Kunth) Dandy (Hsu 94; from Hsin-tien, Formosa)

panicles open 12–15 cm long, branches filiform, spikelets fascicled; spikelets about 2 mm long; glumes membranous, the lower 3-veined, 1/2 as long as the spikelets, the upper 5-veined, 1/2–2/3 as long as the spikelet; lower lemma 7-veined, as long as the spikelet; upper florets elliptic, subacute.

This is a genus never reported before from the Island. The species is recorded here for the first time. It resembles *Panicum*, but is characterized by a shorter upper glume which is only one-half to two-thirds, as long as the spikelet. It was collected at Hsin-tien (17, X 1955, Hsu 94; 21, XII. 1936, Shimizu 3162). Found alone the forest margins.—Distributed in the Philippines, Malaysia, S. China and India.

## 13. **Panicum** L. 黍屬

1. Upper florets ridged, triangular in cross-section; lodicules thin and transparent, 3–7-veined:
 2. Leaves linear.....2. *P. bisulcatum*
 2. Leaves ovate to linear-lanceolate:
  3. Grasses with weak, usually decumbent culms; blades thin:
   4. Blades narrowed at base; first glume 1/2 as long as the spikelet...*P. trichoides*[1]
   4. Blades amplexicaular; first glume as long as the spikelet.....3. *P. brevifolium*
  3. Grasses with wire-like struggling culms; blades hard in touch:
   4. Blades ciliate at margin; lower palea absent .....8. *P. notatum*
   4. Blades not ciliate at margin; lower palea as long as the spikelet .....5. *P. incomtum*
1. Upper florets plano-convex or lentiform in cross-section; lodicules thicker, numerous-veined:
 2. Upper florets transversely rugose; cultivated tall grass.....6. *P. maximum*
 2. Upper florets not transversely rugose:
  3. Aquatic or on moist soils; first glume truncate, 1/5 as long as the spikelet; upper florets nearly plano-convex in cross-section:
   4. Spikelets about 3.5 mm long:
    5. Lower palea present; rhizomatous; culms hard.....4. *P. repens*
    5. Lower palea absent; not rhizomatous; culms spongy .....9. *P. paludosum*
   4. Spikelets about 2.1 mm long .....*P. dichotomiflorum*[1]
  3. Not aquatic; first glume more than 1/3 as long as the spikelet; upper florets lentiform in cross-section:
   4. Spikelets usually reddish purple, about 1.5 mm long.....1. *P. austro-asiaticum*
   4. Spikelets more than 2 mm long:
    5. Plant not covered with tubercle-based hairs.....10. *P. psilopodium*

[1] Not found in Formosa, but reported from East Asia.

5. Plant covered with tubercle-based hairs:
6. Vein of glumes and lower lemmas anastomosing.....4. *P. cambogiense*
6. Vein of glumes and lower lemmas not anastomosing:
7. Lower lemmas 7-veined; not cultivated .....12. *P. trypheron*
7. Lower lemmas 11-veined; cultivated.....7. *P. miliaceum*

See my paper "A study on Formosan *Panicum* (*Gramineae*), with special reference to their lodicules" in Journ. Japan, Bot. 38 (3): 75-86 (1963) for further notes on the following species.

13-1. ***Panicum austro-asiaticum*** Ohwi

南亞黍—Locally in Taipei, Hsinchu, Nantou, Pingtung.—X-I.

13-2. ***Panicum bisulcatum*** Thunb.

糠稷 N=18 (Chen, Formosa)—Locally in Taipei, Miaoli, Taichung, Nantou, Taitung.—X-XII.

13-3. ***Panicum brevifolium*** L.

短葉黍 N=18 (Chen, Formosa)—Locally in Taipei, Nautou.—VI-XII.

13-4. ***Panicum cambogiense*** Balansa

網脈稷—Locally in Kaohsiung.—V-VIII.

13-5. ***Panicum incomtum*** Trin.

藤竹草 N=18 (Chen, Formosa)—Locally in Taipei, Miaoli, Taichung, Nantou, Tainan, Pingtung, Taitung.—X-II.

13-6. ***Panicum maximum*** Jacq.

畿尼亞草 (Hsu) Guinea Grass—N=16 (Chen, Formosa)—Locally in Taipei, Taoyuen, Miaoli, Taichung, Nantou, Tainan.—IV-XI.

13-7. ***Panicum miliaceum*** L.

稷 2N=36, 72 (Arenkova)—Broomcorn Millet—cultivated.

13-8. ***Panicum notatum*** Retz.

心葉稷 N=18 (Chen, Formosa)—Locally in Taipei, Miaoli, Nantou.—VII-X.

13-9. ***Panicum paludosum*** Roxb.

水生黍 N=28 (Chen, Formosa)—Locally in Taipei, Taoyuen, Hsinchu, Yunlin, Nantou, Tainan, Kaohsiung, Pingtung, Ilan, Lanyu.—V-X.

13-10. ***Panicum psilopodium*** Trin.

細柄黍 N=18 (Chen, Formosa)—Locally in Taipei, Hsinchu, Miaoli, Taichung, Nantou.—IV-VIII.

13-11. ***Panicum repens*** L.

舖地黍 2N=18II+9I. (Chen, Formosa)—Locally in Taipei, Taoyuen, Hsinchu, Yunlin, Nantou, Tainan, Kaohsiung, Pingtung, Taitung, Ilan, Lutao, Lanyu, Penghu.—VII-XII.

13-12. ***Panicum trypheron*** Schult. var. ***suishaensis*** (Hay.) S Hsu
水社黍 (Hsu)—Known from Nantou—VIII.

### 14. **Paspalidium** Stapf 類雀稗屬

14-1. ***Paspalidium punctatum*** (Burm.) A. Camus (*Panicum geminatum* Honda, non Forsk)
水雀稗 (Hsu)

Culms stout, spongy; racemes 12–13, 1–3 cm long, distant and appressed to the main axis; upper florets cuspidately acuminate, rugose.

Aquatic, found in wet places, in ponds. Rarely collected, only from the southern part of Formosa. Very similar to Paspalum but differs from it in having a well-developed lower glume and transversely rugose upper floret.—Locally in Tainan.—IX-III.—Distributed in S. China, the Philippines to India.

### 15. **Paspalum** L. 雀稗屬

1. Racemes 2, subopposite; spikelets acute; culms long creeping:
 2. Upper glume usually pubescent lower glume present in some of the spike lets; spikelets twice as long as broad.....4. *P. distichum*
 2. Upper glume glabrous; lower glume wanting; spikelets three times as long as broad.....9. *P. vaginatum*
1. Racemes 2 or more, alternate; spikelets obtuse; culms not creeping except in *P. conjugatum:*
 3. Spikelets villous on margins, hairs 1–2 mm long:
  4. Racemes 2, paired, slender; spikelets 1.5–2 mm long, pale yellow in color; culms long creeping.....2. *P. conjugatum*
  4. Racemes more than 3; culms tufted:
   5. Racemes 3–7; spikelets 3–4 mm long.....3. *P. dilatatum*
   5. Racemes more than 10; spikelets 2–3 mm long.....8. *P. urvillei*
 3. Spikelets glabrous, of short hairs less than 0.25 mm long:
  6. Sheaths and blades villous or hirsute:
   7. Spikelets rather far apart on rachis; floret light yellow in color at maturity; upper glume and lower lemma 3 veined.....7. *P. thunbergii*
   7. Spikelets crowded; upper florets brown at maturity; upper glume and lower lemma 5-veined.....1. *P. commersonii*
  6. Sheaths and blades nearly glabrous:
   8. Spikelets paired; apiculate, 4-rowed, more or less covered with short hairs; racemes 7–20, rarely 4.....5. *P. longifolium*
   8. Spikelets solitary, 2-rowed, glabrous; racemes 2–7.....6. *P. orbiculare*

15-1. ***Paspalum commersonii*** Lamk. (*P. formosanum* Honda)

臺灣雀稗 (Hsu)

Culms loosely tufted; sheaths and leaves pilose-tomentose; racemes 2-4; stigmas black purple in color.

Not so common. It is said to have some pasture value.—Locally in Taipei, Miaoli, Taichung, Yunlin, Nantou, Tainan, Pingtung Taitung, Hwalien, Ilan, Lutao, Lanyu.—III-XII.—Distributed in tropics and subtropics of the Old World.

15-2. ***Paspalum conjugatum*** Berg.

兩耳草 N=20 (Chen, Formosa) Buffalo Grass

Culms stoloniferous; blades ciliated on margins; racemes conjugate, slender.

A very common weed in cultivated and waste grounds, also found along paths in forests up to an altitude of 1,000 m. Growing well in shady places and forming a dense mat.—Locally in Taipei, Taoyuen, Taichung, Nantou, Chiayi, Tainan, Kaohsiung, Pingtung, Taitung, Hwalien, Ilan.—VII-X—Distributed widely in the tropics.

15-3. ***Paspalum dilatatum*** Poir.

大理草 (Hsu) 2N=50 (20II+10I, Chen, Formosa) Dallis Grass.

Culm bases geniculate; racemes 3-8, 6-8 cm long; spikelets 3-3.5 mm long.

A naturalized rhizome-forming grass. It can endure drought and is grows well in wet situations. Valuable for hay and silage.—Locally in Taipei, Taichung, Pingtung. —IV-X—A native of S. America, introduced to warm countries.

15-4. ***Paspalum distichum*** L.

雙穗雀稗 N=20, 30 (Chen, Formosa)

Culms stoloniferous; racemes 2; upper glumes pubescent.

Common in rice fields, wet places and along ditches even to brackish water. It can stand drought and may by found in some coastal areas.—Locally in Taipei, Hsinchu, Tainan, Pingtung, Taitung.—V-XII.—Distributed in Tropics of the world.

15-5. ***Paspalum longifolium*** Roxb.

長葉雀稗 N=20 (Chen, Formosa)

Culms tufted; blades 10-20 cm long or more; spikelets usually pubescent, paired at least at middle of the raceme.

Growing both in open fields and in swamps. The rachis is very much broadened in plants growing in swamps.—Locally in Taipei, Taoyuen, Taichung, Nantou, Kaohsiung, Pingtung.—II-X.—Distributed in S. China, Indo-China, Malaysia and the Philippines.

15-6. ***Paspalum orbiculare*** Forst. (*P. akoense* Hay.)

圓果雀稗 N=20 (Chen, Formosa) Ditch Millet

Culms tufted; rachis 1.5-3 mm wide; spikelets about 2 mm long.

Common in fields, roadsides and along paddy fields—Locally in Taichung, Tainan, Pingtung.—Distributed in tropics and subtropics of the Old World.

15-7. ***Paspalum thunbergii*** Kunth ex Steud.

雀稗 2N=40 (Ono & Tateoka, Japan)

Culms tufted; whole plant pilose; racemes 3–5, 5–10 cm long; spikelets green in color, about 2.5 mm long.

Growing on Mt. Tatun, rare—VII-IX.—Distributed in Japan and China.

15-8. ***Paspalum urvillei*** Steud.

吳氏雀稗 (Hsu) 2N=40,60 (Nilson) Upright Paspalum

Culms coarse, erect, tufted; racemes 9–17. erect and appressed to the main axis; margins of spikelets long villous.

This is a excellent pasture grass originally from S. America. It was naturalized recently and should be included in grass flora of the Island.—V.—Introduced to most warm countries.

15-9. ***Paspalum vaginatum*** Sw.

海雀稗 (Hsu) N=10 (Chen, Formosa) Saltwater Couch.

Culms creeping; racemes usually 2 (Rarely 3–5), conjugate or closely approximate at the apex of peduncle.

Common on sea coasts and brackish sands, often foming extensive colonies and acts as a sand-binder. This species is restricted to saline soils and never is found inland.—Locally in Taipei, Yunlin, Tainan, Lutao, Lanyu,—V-XI—Distributed in the tropics and the subtropics of the world.

## 16. **Pennisetum** Rich 狼尾草屬

1. Spikelets with 2–3 mm long pedicel; anthers without a tuft of hairs at one end ..... 1. *P. alopecuroides*
1. Spikelets sessile on hairy main axis; anthers with a tuft of hairs at one end ..... 2. *P. purpureum*

16-1. ***Pennisetum alopecuroides*** (L.) Spreng (*P. japonicum* Trin.)

狼尾草 2N=18 (Ono & Tateoka, Japan)

Culms tufted, 50–100 cm tall; blades 5–8 mm wide; spikelets 7 mm long.

Growing in the northern part of Island. Usually forming large tufts in open fields and roadsides.—Locally Taipei, Miaoli, Taichung, Nantou, Chiayi.—X-XII.—Distributed in Japan, China, the Philippines and India.

16-2. ***Pennisetum purpureum*** Schumach

象草 2N=28 (Burton) Elephant Grass.

Cultivated; culms tufted, up to 4 m high; hairy below inflorescence; blades 5–17 mm wide; spikelets about 6 mm long.

Cultivated for fodder.—A native of Tropical Africa, but now introduced to tropical countries.

## 17. **Pseudoraphis** Griff 僞針茅草

17-1. ***Pseudoraphis spinescens*** (R. Br.) Vickery (*P. squarrosa* (L. F.) Chase)

大僞針茅 (Hsu) N=ca. 20 (Chen, Formosa)

Plant rooting in shallow water and floating upon the surface; panicle branches produced beyond the spikelet into a slender bristle.

Found in pools, edge of ponds and muddy ground.—Locally in Taipei, Tainan, Taitung, Ilan.—VI-IX.—Distributed in South-east Asia, Burma, India and Australia.

### 18. **Rhynchelytrum** Nees 紅毛草屬

18-1. ***Rhynchelytrum repens*** (Willd.) C. E. Hubb.

紅毛草 2N=36 (Avdulov) Natal Grass.

Culms ascending; panicles 10-20 cm long; spikelets feathery pink, or white; pedicels long haired.

Naturalized in Taitung (6, XI. 1962, Chang 5) and should be included in the Formosan grass flora. It may have some ornamental value but does not seem to be of much account as a fodder grass.—Native of Tropical and South Africa, now introduced into most tropical countries.

### 19. **Sacciolepis** Nash 囊穎草屬

1. Aquatic; inflorescence 3-13 cm long; culms erect; blades 10-30 cm long .....2. *S. indica var. oryzetorum*
1. Terrestrial; inflorescence 1-6 cm long; culms geniculate; blades less than 12 cm long.....1. *S. indica*

19-1. ***Sacciolepis indica*** (L.) A. Chase (*S. spicata* (L.) Honda)

囊穎草 2N=18 (Tateoka, Japan)

Culms geniculate, more or less prostrate; blades 2-4 mm broad; panicle contracted, green in color.

Abundant throughout the Island. Growing along ditches or moist grounds.—Locally in Taipei, Taoyuen, Miaoli, Taichung, Yunlin, Nantou, Taitung, Hwalien, Lutao, Lanyu.—IV-IX.—Distributed in Tropical Asia, Polynesia to Australia.

19-2. ***Sacciolepis indica*** (L.) A. Chase *var.* ***oryzetorum*** (Makino) Ohwi

水囊穎草 (Hsu) N=9 (Chen, Formosa)

Culms tufted, more or less spongy; blades 3-7 mm broad; panicle contracted, purplish.

Growing in sunny moist lowlands, usually growing along paddy fields and swamps.—Locally in Taoyuen, Taichung, Nantou.—VI-VII.—Distributed in Japan and China.

### 20. **Setaria** P. Beauv. 狗尾草屬

1. Panicle loosely open; only part of spikelets with bristles arising from its base; blades folded fan-fashion between the longitudinal veins:
2. Upper florets ovate, obscurely rugose; blades 3-7 cm wide.....6. *S. palmifolia*

2. Upper florets narrowly ovate; transversely rugose; blades 1–3 cm wide .....7. *S. plicata*

1. Panicle contracted, cylindrical; spikelets almost covering main axis; blades not plicate:

3. Lower palea broadly ovate to ovate, as long as the lower lemma; upper florets obviously rugose; sheath margins glabrous:

4. Spikelet 3–4 mm long; bristles golden in color.....3. *S. glauca*

4. Spikelets 2–2.8 mm long; bristles purplish brown in color:

5. Rhizomatous, perennial.....2. *S. geniculata*

5. Not rhizomatous, annual .....5. *S. pallide-fusca*

3. Lower palea distinctly shorter than the lower lemma or reduced; sheaths at least hairy on margins:

6. Main axis of panicle serrulate; bristles retrorsely barbed....8. *S. verticillata*

6. Main axis of panicle hairy; bristles antrorsely barbed:

7. Upper glumes 2/3/–3/4 as long as the spikelet; blades more or less hairy ..... 1. *S. faberii*

7. Upper glumes as long as the spikelet or nearly so; lower palea less than 1/2 as long as the spikelet:

8. Glumes and lower lemma persistant; upper florets deciduous....4. *S. italica*

8. Glumes and lower lemma falling off together with upper floret...(*S. viridis*)

9. Anthers purplish black in color.....10. *var. viridis*

9. Anthers yellowish brown; long bristled.....9. *var. pachystachys*

20-1. ***Setaria faberii*** Herrm. (*S. autumnalis* Ohwi)

法氏狗尾草 2N=36 (Tateoka, Japan)

Blades and sheaths hairy; panicle spike-like; spikelets about 3 mm long.

Rare—Locally in Taipei, Taoyuen, Taichung, Lutao, Lanyu.—IV-IX.—Distributed in Japan and China.

20-2. ***Setaria geniculata*** (Lamk.) P. Beauv.

莠狗尾草 N=36 (Chen, Formosa) Knot-Root Bristle Grass.

Plant with knotty rhizomes; panicle spike-like; spikelets about 2 mm long.

In open fields, up to medium altitudies, common throughout the Island.—Locally in Taipei, Taoyuen, Taichung, Nantou, Tainan, Pingtung, Hwalien, Lutao, and Lanyu. —Distributed in tropical and temperate regions.

20-3. ***Setaria glauca*** (L.) P. Beauv. (*S. lutescens* (Weig.) F. T. Hubb.)

金色狗尾草 2N=18, 36 (Avdulov) Yellow Bristle Grass.

Panicle spike-like; blades glabrous except sheath mouth; spikelets 3–4 mm long.

Not common—Distributed in warm temperate zone of the Old World.

20-4. ***Setaria italica*** (L.) P. Beauv.

小米 2N=18 (Avdulov) Italian Millet.

Panicle nodding, 10–40 cm long spikelets globose, 2–3 mm long.

Cultivated, especially by Mountain Tribes for its grains. Also escaped and appearing in waste places. It is a good bird food.—Locally in Taipei, Taichung, Nantou, Chiayi, Taitung, Ilan.—VII-VIII.—Widely distributed in temperate regions.

20-5. ***Setaria pallide-fusca*** (Schumach) Stapf et C. E. Hubb.

褐色狗尾草 (Hsu) 2N=18 (Krishnaswamy)

Culms tufted; without woody rhizome; panicle spike-like, brownish.

Common throughout the Island. It is very difficult to separate from *S. geniculata* if the rhizome is not observed. It is here confirmed that this species does occur in Formosa and is probably a good fodder grass.—Distributed in tropics of the Old World.

20-6. ***Setaria palmifolia*** (Koen.) Stapf (*S. plicata* Willd.)

棕葉狗尾草 N=27 (Chen, Formosa) Palm Grass.

Panicle open, as much as 40 cm long; blades up to 40 cm long; spikelets about 2.5 mm long.

This is a very common tall grass growing in shady ravines and along forest margins. It perhaps has ornamental values and may be used as fodder.—Locally in Taipei, Taoyuen, Miaoli, Nantou, Tainan, Pingtung, Hwalien, Ilan, Lutao.—Distributed in tropics of the Old World.

20-7. ***Setaria plicata*** (Lamk.) T. Cooke (*S. excurrens* (Trin.) Miq.)

皺葉狗尾草 2N=72 (Tateoka, Japan)

Blades narrowly lanceolate; panicles open, less than 25 cm long; spikelets about 3.5 mm long.

Not common, only found in the edges of thickets and clearings at medium altitudes—Locally Chiayi, Pingtung.—VII-VIII.—Distributed in China, India and Malaysia.

20-8. ***Setaria verticillata*** (L.) P. Beauv.

倒刺狗尾草 (Hsu) 2N=18 (de Wet, 1954) Bur Bristle Grass.

Panicle spike-like, interrupted with some branches at lower part; bristles 1-4, 4-16 mm long, margins fringed with barb-like hairs directed downwards.

Not common. Growing in cultivated lands—IV-VI—Widely distributed in the tropics and temperate regions of the Old World.

20-9. ***Setaria viridis*** (L.) P. Beauv.

狗尾草 2N=18 (Tateoka, Japan) Green Foxtail

Spikelets 2 mm long, ovate, obtuse; bristles 6-8 mm long; lower glumes 1/3 as long as the spikelet.

Weed in gardens and waste place.—Locally in Taipei, Yunlin, Tainan, Nantou, Pingtung, Lutao and Lanyu.—Widely distributed in warm to cooler temperate regions of the Old World.

20-10. ***Setaria viridis*** (L.) P. Beauv. *var.* ***pachystachys*** (Fr. et Sav.) Makino et Nemoto

海濱狗尾草 (Hsu) N=9 (Chen, Formosa)

This variety is one of the littoral grasses. It is more common than the species. Usually it has much longer bristles than the species.—Locally in Taipei, Taichung, Yunlin, Pingtung, Taitung, Penghu, Lutao.—I-XII.—Distributed in warm regions.

### 21. **Spinifex** L. 濱刺草屬 (Hsu)

21-1. ***Spinifex littoreus*** (Burm. f.) Merr. (*S. squarrosus* L.)
濱刺草 (Hsu) 2N=18 (Tateoka, 1959)

Culms hard, stout, farinose; blades hard, involute-subulate; curved, 2.3–3 mm wide; pistillate spikelets in stellately arranged spatheate umbels; staminate spikelets usually several on each spike, the rachis 4–9 cm long.

Growing in the sand dunes around the coasts. It is an excellent sand-binder.—Locally in Taipei, Hsinchu, Taichung, Chiayi, Yunlin, Kaohsiung, Pingtung, Taitung. —I-XII.—Distributed in S. China, Indo-China, India, Ceylon Malaysia and the Philippines.

### 22. **Thuarea** Pers. 濱箬草屬 (Hsu)

22-1. ***Thuarea involuta*** (G. Forst.) R. Br. ex Roem. et Schult. (*T. sarmentosa* Pers)
濱箬草 (Hsu) 2N=9 (Chen, Formosa)

Culms slender, creeping; blades lancolate, 2–5 cm long; inflorescence a terminal raceme, the spikelets borne in one series on the puberulent rachis.

Monotypic. Growing along coasts and forming mats. It is useful as a sandbinder —Locally in Taipei, Pingtung, Lutao, Lanyu, Penghu.—Distributed in Liukyu, S. China, Islands of Indian Ocean, Malaysia, the Philippines, Polynesia and Australia.