References
Allan, H. H. 1940: *A handbook of the naturalized flora of New Zealand*. DSIR Bull. 83.
Cheeseman, T. F. 1883: The naturalised plants of the Auckland Provincial District. *TRSNZ* 15:268-298.
Esler, A. E. 1988: *Naturalisation of plants in urban Auckland*. DSIR Publishing.
Harden, G. J. (ed.) 1992: *Flora of New South Wales Vol. 3.* NSW University Press.
Healy, A. J. 1970: *Identification of weeds and clovers*. New Zealand Weed & Pest Control Society/Editorial Services, Wellington.
Jarvis, C. E. 1984: The genus *Tolpis* Adanson and its occurrence in the Cape Verde Islands (Phanerogamae: Asteraceae: Cichoreae). *CFS 68*: 179-184, 1 Abb.
New Zealand Weed & Pest Control Society. 1969: *Standard common names for weeds in New Zealand.* Editorial Services Ltd, Wellington.
Park, S.-J.; Korompai, E.; Francisco-Ortega, J.; Santos-Guerra, A.; Jansen, R. K. 2001: Phylogenetic relationships of *Tolpis* (Asteraceae: Lactuceae) based on ndhF sequence data. *Plant Syst. Evol.* 226: 23-33.
Webb, C. J.; Sykes, W. R.; Garnock-Jones, P. J. 1988: *Flora of New Zealand Vol. IV.* Botany Division, DSIR, Christchurch.

Needle-grasses and nasellas (Gramineae: Stipeae)

Rhys Gardner

Last year, a number of these grasses were brought in to AK herbarium by biosecurity officers of the Auckland and Bay of Plenty regions. Their collections of *Austrostipa ramosissima* and *Stipa gigantea* provide first New Zealand records, though the latter appears to be known here only as a cultivated plant, so far.

The treatment of the stipoid grasses in Flora NZ V (Edgar & Connor 2000) is not straightforward. One faces first a key to a dismembered *Stipa*, its parts being treated as the genera *Acnatherum*, *Anemanthele*, *Austrostipa*, *Nasella* and *Piptatherum*. The key characters are those of the florets. But the usual patience and hand-lens may not suffice for the keying-out of some taxa.

A problem comes in the first couplet, which deals with the character of the lemma:
Margins of lemma overlapping; lemma 5-7-nerved, *versus*
Margins of lemma contiguous; lemma 3-nerved.

These lemmas are thick, and often hairy and silicified too, and their nerves can only be determined by dissection; there is no ribbing that might be visible with a x 10 lens. So one depends on the nature of the margin, and it is here that two species fall into the wrong lead. In my observation, our coastal *Austrostipa stipoides* never has overlapping lemma margins. And our forest grass *Anemanthele lessoniana* sometimes has contiguous lemma margins as required, but sometimes these are overlapping, at least distally and before the lemma becomes expanded by the developing grain.

The next problem comes in the second couplet, with the second-mentioned but easier-to-use character that separates *Austrostipa* from *Nasella* being:
lemma coriaceous ... *Austrostipa*
lemma silicified, tuberculate ... *Nasella*

The three nasellas now found in New Zealand do possess a lemma densely encrusted with purple scabrities and tubercles (something like a orc's tuxedo, perhaps). But so do *Austrostipa verticillata* and *A. ramosissima*, and although their stiffening is not as extreme as in, for example, *N. trichotoma*, one would probably not describe these lemmas just as coriaceous (as in, say, *Austrostipa stipoides*, where tubercles are lacking).

A third problem comes in the last couplet, which distinguishes between the two genera whose florets have a deciduous awn, that is, the native *Anemanthele* and the Eurasian *Piptatherum*:
Floret laterally compressed; stamen 1 ... *Anemanthele*
Floret dorsally compressed; stamens 3 ... *Piptatherum*

As grass florets go, these are not exceptionally small (c. 2 mm long) but they are certainly small enough to make the shape difference hard to detect with a lens. Luckily there are easier differences to use, at least as concerns the single weedy species of *Piptatherum* in New Zealand.

Presented below then is a simplified key to the stipoid grasses in the Auckland region, that is, it omits those found only in the South Island (mostly in Marlborough and Canterbury). Also included in the key is the non-stipoid *Microlaena polynoda*, bush rice-grass. In Flora NZ V, in the accounts of *Anemanthele lessoniana* and *M. polynoda*, it is noted that these two unrelated native grasses might be confused with one another, but no hints for the novice are given.

Key to stipoid grasses in the Auckland region

1. Leaves ± flat at least in life, 3 mm or more wide; plant sometimes like a miniature bamboo, sometimes with copious branching at culm nodes (but not in *N. neesiana* or *S. gigantea*) 2
Leaf blades inrolled or terete, to c. 1 mm diam.; plants relatively densely tufted (new shoots intravaginal), culms not branched (except rarely in *N. tenuissima* ?) 8

2. Apex of leaf sheath with tuft of bristles to c. 5 mm long; cross-veins of blade (dried) prominent abaxially ------ ----------***Microlaena polynoda***
Apex of leaf sheath without bristles; cross-veins of blade obscure even in dried specimens..... 3

3. Spikelets large, glumes 15-25 mm long, awn to c. 7 cm long 4
Spikelets with glumes not more than c. 4 mm long 5

4. Lemma c. 20 mm long, its apex with a pair of membranous lobes c. 5 mm long ----------***Stipa gigantea***
Lemma c. 6 mm long, apex with a conspicuous ring of spines to 1 mm long, not lobed ----***Nasella neesiana***

5. Awn deciduous; lemma 2-2.5 mm long, lacking hairs 6
Awn not deciduous; lemma 1.8-4 mm long or more, tubercular-scabrid, and hairy or not 7

6. Lemma scabridulous near apex; awn curved to flexuose, to c. 8 mm long; leaf blade relatively firm, smooth adaxially ----------***Anemanthele lessoniana***
Lemma smooth and shining; awn ± straight, c. 4 mm long; leaf blade membranous, pubescent adaxially ----- ----------***Piptatherum miliaceum***

7. Lemma 1.8-2.5 mm long, glabrous ----------***Austrostipa ramosissima***
Lemma 2.7-4 mm long, with a few hairs ----------***Austrostipa verticillata***

8. Lemma asymmetrically swollen, thus the awn excentric; leaf blades inrolled, 0.5 mm diam., abaxially scabrid - ----------***Nasella trichotoma***
Lemma terete 9

9. Leaf blades c. 0.75 mm diam. (each half hemicircular in section and appressed against the other), abaxially glabrous; lemma c. 9 mm long, smooth, hairy all over ----------***Austrostipa stipoides***
Leaf blades c. 0.35 mm diam., so tightly inrolled as to appear terete, abaxially scabridulous; lemma 2 mm long, tuberculate, hairy dorsally ----------***Nasella tenuissima***

Notes

1. *Anemanthele lessoniana* (Steud.) Veldkamp
A native grass of dryish forest and scrub, hardly seen nowadays in the North Island except in cultivation. Flora NZ V includes "North Auckland" in its distribution, on what basis I do not know. It is increasingly popular in Auckland's gardens; at least, temporarily so — Peter de Lange says (AK !) that he has seen it exceeding its bounds in Terry Hatch's Bombay nursery and similarly in a Laingholm garden.

2. *Austrostipa stipoides* (Hook.f.) S.W.L.Jacobs & J.Everett
The sometimes too familiar pungent-leaved native "coastal morality grass" of coastal sands and shell banks, sandstone ledges just above HWM, etc. It seems not to have been tried as an ornamental, even in heroic gardens.

3. *Austrostipa ramosissima* (Trin.) S.W.L.Jacobs & J.Everett
An Australian grass, apparently a recent import to New Zealand (though some material sold here under this name is *A. verticillata*). Naturalized plants seem to be known only from the following collection: Tauranga, Welcome Bay, *W. Stahel*, 25 Jun 2002, AK 257363 - 5.

4. *Austrostipa rudis* (Nees) S.W.L.Jacobs & J.Everett
Flora NZ V notes this Australian grass in North Auckland only from "near Henderson". The AK collections all come from near the junction of Arrowsmith and Wairere Roads, c. 2 km west of Waitakere, where an infestation was first seen in 1989 (AK 184638), and still persists (C. McKain *pers. comm.*).

5. *Austrostipa verticillata* (Nees) S.W.L.Jacobs & J. Everett
An Australian grass, probably long-cultivated in NZ gardens but currently known wild perhaps only from Nelson-Marlborough and from Wanganui (C. Ogle *pers. comm.*).

6. *Stipa gigantea* Link
This very robust grass (to 2.8 m tall), a native of the Mediterranean region, is being grown in an Auckland garden, so far without sign of naturalization. A voucher is: Whitford, Pott's Road, Ayrlie property, AK 255372. The stiff boat-like glumes and long bent awns give the inflorescence some resemblance to wild oats (*Avena fatua*).

7. *Nasella neesiana* (Trin. & Rupr.) Barkworth

A robust South American grass, weedy in Australia and in New Zealand (especially Marlborough). The long-standing Waitakeres infestation, at the start of the tramline to the Waitakere Dam (AK 216534, coll.1974), may have been eradicated, with plants last being seen there in November 1999 (C. McKain *pers. comm.*). It was collected from Western Springs in Auckland City in 1984 (AK 168398).

8. *Nasella trichotoma* (Nees) Arechav. nasella tussock

Flora NZ V begins the NZ distribution of this South American pest by noting "scattered small infestations from Kaitaia to Coromandel Peninsula". The only such collection in AK is one from Mangere Mountain, made in 1983 (AK 170722).

9. *Nasella tenuissima* (Trin.) Barkworth

In contrast to the above, this new South American pest continues to be brought into AK, and the distribution given by Flora NZ V of "Auckland and Hamilton cities" should probably be amended now just to "drier parts of the North Island". In AK there are collections from as far apart as Kerikeri, Stratford, and Masterton (vigorously naturalized here). It should be looked for in garden centres and lifestyle plantings, sometimes under junk names like "Japanese rush grass" or *Carex* "Roy Bertle".

10. *Piptatherum miliaceum* (L.) Coss.

This somewhat weedy grass of dry open places is native to the Mediterranean region. It is unclear how long it has been in New Zealand — it may be the basis for early records of "*Stipa verticillata*".

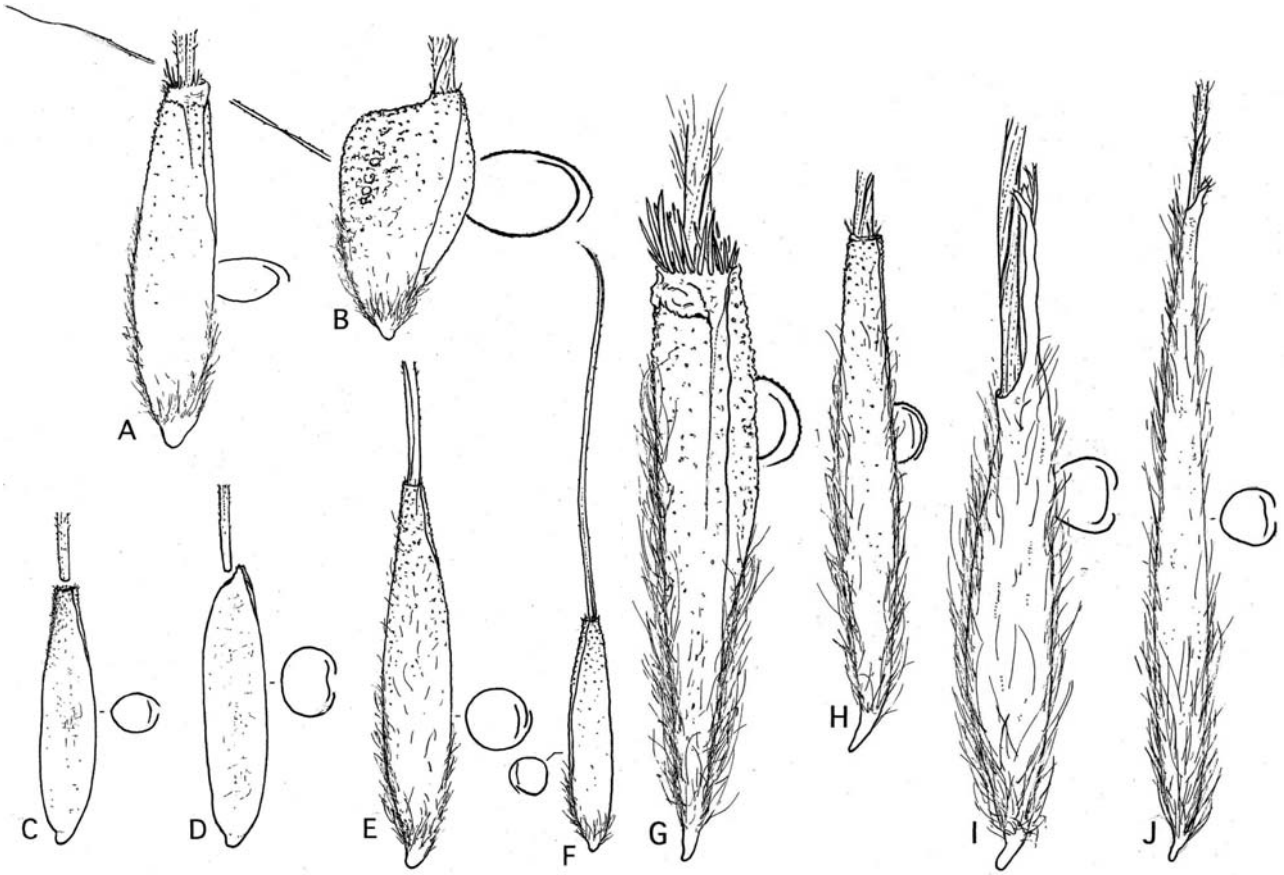

Fig: Florets of stipoid grasses. Orientated with dorsal (abaxial, awn-bearing) side of lemma to left. Cross-section diagram for each made about half way up the floret or slightly lower; note that in the *Nasella* species (A, B, G) only the lemma is shown, since the short palea does not reach up to the level of the section.

A. *Nasella tenuissima* x 16. AK 221059.
B. *Nasella trichotoma* x 16. AK 170266.
C. *Anemanthele lessoniana* x 16. AK 255592.
D. *Piptatherum miliaceum* x 16. AK 149946.
E. *Austrostipa verticillata* x 16 AK 255949.
F. *Austrostipa ramosissima* x 12. AK 257364.
G. *Nasella neesiana* x 8. AK 242752.
H. *Austrostipa rudis* x 12. AK 234431.
I. *Stipa gigantea* x 4. AK 255372.
J. *Austrostipa stipoides* x 8. AK 180496.

Reference

Edgar, E. & Connor, H. E. 2000: Flora of New Zealand. Vol. V. Gramineae. Manaaki Whenua Press, Christchurch.