How to separate vegetative material of Slender Speargrass and Serrated Tussock

Summary

The characters which most readily and reliably separate vegetative material of these two species are leaf-blade diameter and the length of leaf-blade hairs. Slender Speargrass blades are to 1 mm diameter, twice that of Serrated Tussock blades. Slender Speargrass blade hairs are usually 0.2–0.3 mm long and readily visible with a 10-x lens in good light. Those of Serrated Tussock are <0.1 mm long and therefore not as readily visible with a 10-x lens in good light, although they are usually more palpable.

If a good quality, older ligule is available, its colour, texture, and the presence/absence of hairs on the upper margin are also reliable characters: Slender Speargrass has a less robust membranous ligule with a fringe of hairs on the upper margin, and Serrated Tussock has a more robust opaque-whitish, papery ligule (Wheeler, Jacobs and Whalley 2002) without fringing hairs.

Less reliable characters are habit, blade length and colour, ligule length and shape, and the presence/absence of hairs at the sheath/blade junction (auricular hairs).

Introduction

It can be difficult to separate these two narrow-leaved perennial grass species in the field, when they lack fertile material (flower buds, flowers, or fruits/seeds). This is a particular problem because Slender Speargrass *Austrostipa scabra* is a widespread and common native species in extratropical Australia, and Serrated Tussock *Nassella trichotoma* is one of the most serious weed species in south-eastern Australia (Osmond *et al*. 2008). There are two subspecies of Slender Speargrass: subspecies *falcata* is most abundant in the winter rainfall region (which includes the ACT), and subspecies *scabra* in the summer rainfall region, but they can co-occur, and can hybridise.

For those seeking to separate fertile material of the two subspecies of Slender Speargrass, I recommend the key in VicFlora. The length of basal leaf-blades usually serves to separate sterile material (subspecies *falcata* usually <15 cm; subspecies *scabra* usually >15 cm).

This paper aims to describe and illustrate the vegetative characters that separate the two species when they are not flowering.

Methods

Seventy collections, mainly from the Southern Tablelands of NSW, were borrowed from the Australian National Herbarium and numerous vegetative characters recorded for each. An additional 84 collections from eastern Australian states were checked at the National Herbarium of NSW for blade hair length and ligule characters. Leaf-blade dimensions are

from AusGrass2, VicFlora, and Wheeler, Jacobs and Whalley (2002). The images were taken on a Nikon SMZ25 stereo microscope.

Results

The vegetative characters which serve to separate the two species are given below.

Habit

Slender Speargrass is more erect and tends not to develop the strongly weeping habit of older plants of Serrated Tussock. In younger Serrated Tussock plants, this character is less reliable.

David Eddy (personal communication 1 August 2023) has suggested two other habit characters to separate the species: the density of leaves within a tussock (more densely packed in Serrated Tussock) and basal area (greater in Serrated Tussock than in Slender Speargrass). I agree that this is the case on the Southern Tablelands, where *A. s*. ssp. *falcata* is more common but am not sufficiently familiar with *A. s.* ssp. *scabra* to know if they apply to it as well. I would be interested to hear from those in the summer rainfall zone whether this comparison works for *A. s.* ssp. *scabra.* A very robust (large basal area) collection of *A. s.* ssp. *scabra* from Gundabooka National Park on the North Western Plains of NSW (IC 10499) belies this.

Leaf-blade colour

Serrated Tussock can be a yellower (lime) green than Slender Speargrass.

Leaf-blade dimensions

Leaf-blade diameter is a more useful measurement than width, as neither species has a flattened blade. Leaf-blades are either convolute (rolled with overlapping margins) or involute (with margins rolled inwards and touching) or, in Slender Speargrass, conduplicate (folded together). Slender Speargrass blades are to 1 mm diameter, twice that of Serrated Tussock blades, which are filiform (thread-like) to 0.5 mm diameter (Table 1).

Leaf-blade length works better in the winter rainfall area where the shorter leaves to 15 cm of *A. s.* ssp. *falcata* contrast more readily with those of Serrated Tussock (15–30(–50) cm). In the summer rainfall area, this comparison breaks down, as *A. s.* ssp. *scabra* can have blades from 15–30 cm long (Table 1). Soil moisture levels, along with grazing pressure, can of course affect blade length.

Table 1. A comparison of some vegetative characters of Slender Speargrass and Serrated Tussock

character	Slender Speargrass		Serrated Tussock
	ssp. *falcata*	ssp. *scabra*	
Habit (older plants)	erect		weeping
Leaf-blade length (cm)	commonly <15 (VF)[2]	commonly >15–30 (VF)	15–45 (AG2)[1] to 30(–50) (VF)
	to 25 (WJW)[3]		
Leaf-blade colour	green		yellower (lime) green
Leaf-blade diameter	to 1 mm (VF)		to 0.5 (VF)
Leaf-blade hair length (mm)	(0.1–)0.2–0.3(–0.6) (n=45)	(0.1–)0.2–0.3(–0.5) (n=52)	<0.1 (n=57)
Ligule colour/texture	membranous, less robust		opaque-whitish, papery, more robust
Ligule length (mm)	0.3–0.6 (AG2) 0.3–0.6 (WJW)	0.6–1 (AG2) (0.3–)0.6–1(–1.5) (WJW)	0.5–2.5 (AG2, WJW)
	0.5–1.5 (VF)		0.5–1 (VF)
Ligule margin	ciliate		eciliate
Ligule shape	bilobed		single lobed
Auricular hairs to 2 mm	+	occasionally +	-

Underlined characters are the most reliable.

[1] AG2 AusGrass2
[2] VF VicFlora
[3] WJW Wheeler, Jacobs and Whalley (2002)

Leaf-blade hair length

Both species have leaf-blade hairs which can feel rough to the touch, but those of Slender Speargrass are longer, from 0.1–0.6 mm, usually 0.2–0.3 mm, than those of Serrated Tussock, which are significantly <0.1 mm (Table 1; Figures 1–2).

Slender Speargrass blade hairs are readily visible at 10-x magnification. Those of Serrated Tussock are like the teeth of a tiny saw pointing up the blade (*serra* is Latin for saw) and are readily palpable if finger and thumb are carefully pulled down the blade (Osmond *et al*. 2008), but not as readily visible at 10-x magnification. Slender Speargrass blades also feel rough downwards, but the hairs have some give in them. This applies to fresh or dry material.

This character may be more difficult to master without a reference leaf of each for field use, but with practice will become useful, especially where only a blade is available, *i.e.* without its basal ligule.

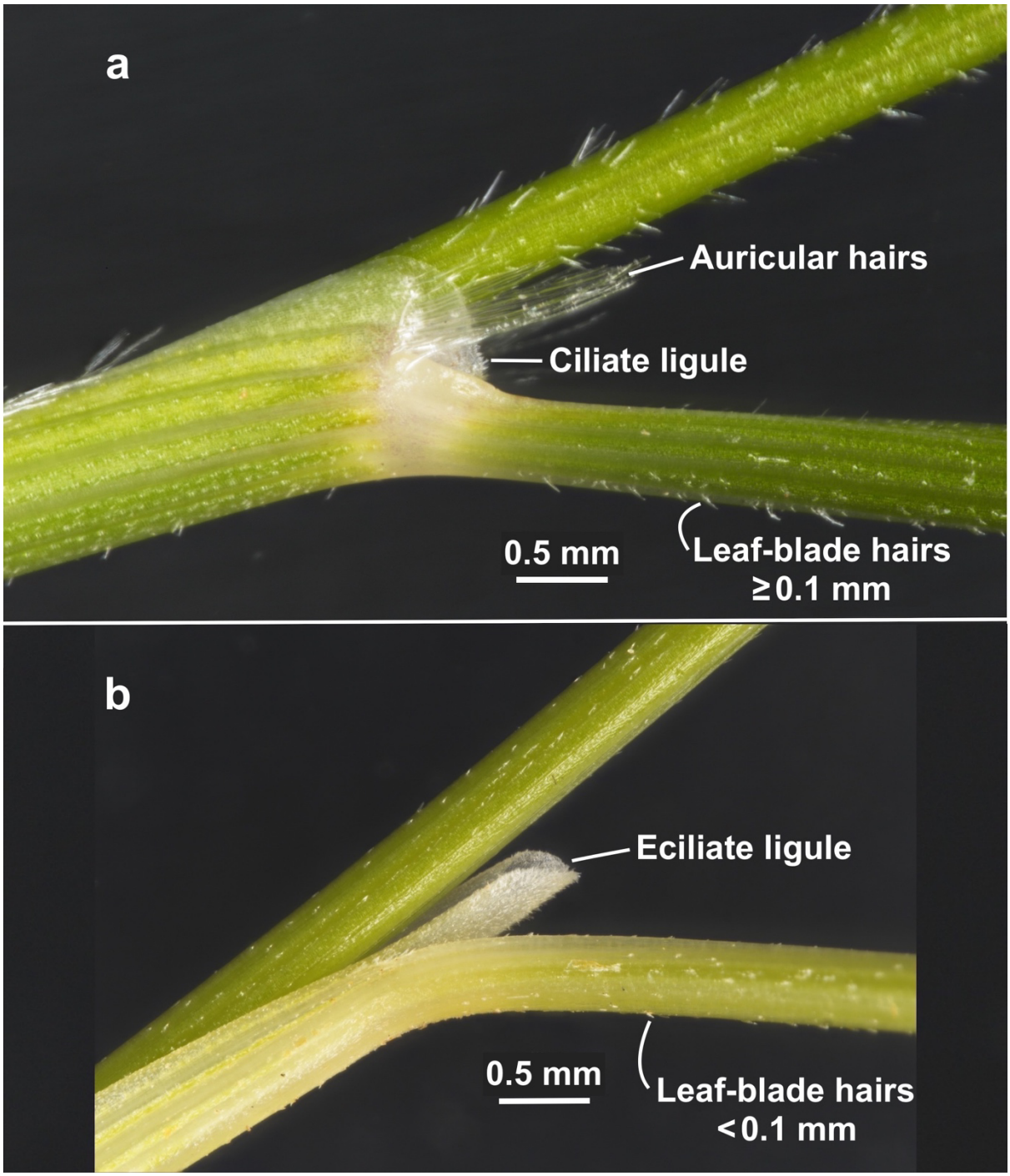

Figure 1 a Slender Speargrass *Austrostipa scabra* ssp. *scabra* (IC 10575*);*
b Serrated Tussock *Nassella trichotoma*.

Ligule

A ligule is 'a small membranous appendage on the top of the sheath of grass leaves' (VicFlora 2023), revealed by gently pulling the blade outwards and down.

In Slender Speargrass, it is membranous and less robust than that of Serrated Tussock, which is opaque-whitish and papery with age (Wheeler, Jacobs & Whalley 2002) (Figure 1 a–b, Table 1).

In Slender Speargrass, the margin is more or less ciliate, *i.e.* fringed with hairs (Figure 1 a). In Serrated Tussock it is eciliate, *i.e.* without marginal hairs (Figure 1 b). Check the top of the ligule for this feature in Serrated Tussock, as the cilia along the upper edge of the leaf sheath sometimes extend to the base of the ligule.

As with leaf-blade length, ligule length can be a useful separator for *A. s.* ssp. *falcata* (0.3–0.6 mm) and Serrated Tussock (≥0.5 mm), but is not as useful for *A. s*. ssp. *scabra* which has longer ligules to 1.5 mm.

The ligule of Slender Speargrass is asymmetrically two-lobed or subtly notched, and that of Serrated Tussock single-lobed. This character can be hard to see on young leaves.

Auricular hairs to 2 mm long, at the junction of the leaf sheath and blade, are often present in Slender Speargrass (Figures 1 a, 2) but not in Serrated Tussock. (Figure 1 b). This character can also be hard to see on some young leaves. Auricular hairs are less common in *A. s.* ssp. *scabra*, and can abrade with age, so this character is not reliable.

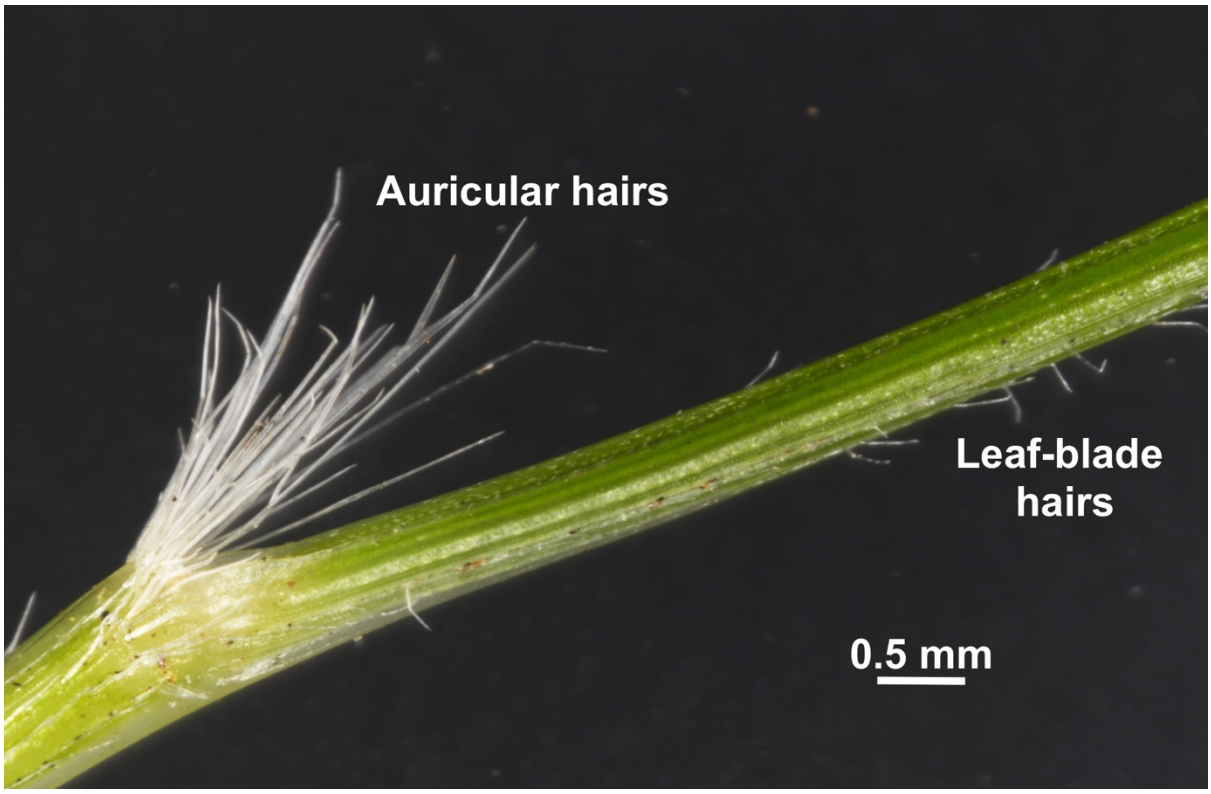

Figure 2. Auricular hairs of some Slender Speargrass *Austrostipa scabra* plants.

Conclusion

The characters which most readily and reliably separate vegetative material of these two species are leaf-blade diameter and the length of leaf-blade hairs. Slender Speargrass blades are twice the diameter of Serrated Tussock blades, and, with experience, this is apparent in the field. Slender Speargrass blade hairs are usually 0.2–0.3 mm long and readily visible with a 10-x lens in good light. Those of Serrated Tussock are significantly <0.1 mm long and therefore not as readily visible with a 10-x lens in good light, although they are usually more palpable. If a good quality ligule is available, the presence (Slender Speargrass) or absence (Serrated Tussock) of hairs on the upper margin is also reliable, along with colour and texture.

The other characters described can be used, but a little caution is advised.

Acknowledgments

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