IDENTIFICATION OF STORKSBILLS (*Erodium* spp.)

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Two species — *Erodium cicutarium* (storksbill) and *E. moschatum* (musky storksbill) — are widely distributed annual (to perennial) adventives in New Zealand [*E. malacoides*, a rare and non-significant adventive, still persists after nearly a century in its original locality, Mangonui]. Occurring alone or together, as minor elements to dominants or co-dominants in different plant communities, storksbills are weeds of waste land, farm- and trucking-yards, cultivated land and domestic gardens, lucerne crops, playing greens and domestic lawns, and low density grasslands — sown pastures and modified short tussock grassland.

While identification at more mature stages usually presents few problems, separation of immature plants is not always easy, the degree of dissection of the leaflets and apical shape of stipules proving somewhat unreliable differentiation characters. As there is need to identify immature plants for weed control purposes, and plant fragments in herbage dissection samples, a check on characters which might prove useful in separating the two species, at different stages of growth, seemed warranted.

While we anticipate that the characters and comments which are given below will be reliable in all districts, we point out that the investigation of seedlings, immature and mature plants, was carried out with live material from the Lincoln district, Canterbury, with certain characters of mature plants checked on herbarium specimens from other localities.

Note:

1. as the information in the tabulation was derived from live plants, details of colour, texture etc. are not reliably applicable to dried material;
2. examine several parts from one plant or preferably several plants;
3. some characters can be seen with the naked eye, provided that the organ etc. is viewed against a suitable background; other characters are best seen by using a hand lens or magnifying glass (x10);
4. certain characters appear to be diagnostic alone, others are best used in conjunction with one or several additional characters.

CHARACTER	<i>E. CICUTARIUM</i>	<i>E. MOSCHATUM</i>
<i>Mature or immature plants: cotyledons absent</i>		
ODOUR	no smell of musk	occasionally a smell of musk
STEMS	often reddish, espec. in dry situations	usually green, occasionally purplish above point of stipule attachment on aerial stems
LEAVES	generally smaller and more delicate than in <i>E. moschatum</i> (Fig. 1,c1)	generally larger and coarser than in <i>E. cicutarium</i> (Fig. 1,m1)

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Fig. 1: *Erodium cicutarium* — c1, leaf; c2 leaflets;
Erodium moschatum — m1, leaf; m2, leaflets.

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i. leaflets	usually dissected more than halfway to midrib; more delicate and finely cut than in <i>E. moschatum</i> (Fig. 1,c2)	usually dissected to less than halfway to midrib; general impression coarse (Fig. 1, m2) [appreciable variation in dissection, and leaflets characteristic of one species may be present on plants of the other species]
ii. axis of leaf, between 1st and 2nd pair of leaflets [bend axis over finger and view from the side]	a line of $\pm$ erect, often dull pink hairs of $\pm$ equal length on upper surface of petiole and axis (Fig. 2,c1, 2,c2)	a line of mixed long and short whitish hairs, erect and inclined, on upper surface of petiole and axis: line of hairs usually whiter and rougher in appearance than that in <i>E. cicutarium</i> (Fig. 2,m1, 2,m2) [some plants cannot be reliably placed with this character alone: one or more additional characters should be used]
iii. stipules [detach and view margins against a dark background]	triangular, apex acute, occasionally blunt; often red-pigmented in rosette forms in dry places, reddish or colourless on aerial stems: margins with projecting short hairs (cilia), very evident on stipules of aerial stems (Fig. 2,c3, 2,c4)	broadly triangular, apex often acute, occasionally blunt; whitish or colourless, rarely pink or purplish-suffused: margins without or with very few short hairs (difficult to see) (Fig. 2,m3, 2,m4) [occasionally stipules of young rosette plants which have just passed cotyledonary stage show $\pm$ equal numbers of marginal hairs in both species]
FLOWERS		
i. peduncle (common stalk of flower cluster)	usually reddish, longitudinal line of white hairs absent (Fig. 2,c6)	green, longitudinal line of white hairs present (Fig. 2, m6)
ii. pedicels (stalks of individual flowers)	usually reddish, longitudinal line or zone of white hairs absent	green, longitudinal line or zone of white hairs — up to one half of circumference, present
iii. bracts	similar in shape and texture to stipules, apex acute, margins with evident projecting hairs (cilia)	similar in shape and texture to stipules, apex acute, rarely blunt, margins without or rarely with few projecting hairs (cilia)

Fig. 2: *Erodium cicutarium* — c1, line of hairs on upper surface of leaf axis; c2, cross-section of leaf axis; c3, c4, stipules, showing apices and marginal hairs; c5, base of petal; c6, peduncle, showing absence of longitudinal line of hairs;

Erodium moschatum — m1, line of hairs on upper surface of leaf axis; m2, cross-section of leaf axis; m3, m4, stipules, showing apices and virtual absence of marginal hairs; m5, base of petal; m6, peduncle, showing longitudinal line of hairs.

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iv. sepals	apical awn or mucro with 1 (occasionally 2-3) terminal bristle(s), white, $\pm$ 1 mm long (Fig. 3,c4)	apical awn or tip $\pm$ blunt without terminal white bristle — if bristle present, $\pm$ colourless, less than 1 mm long (Fig. 3,m4)
v. petals	rose-purple, pink, or whitish, base wedge-shaped, bearded on each side (Fig. 2,c5)	purple, base narrow, $\pm$ parallel-sided, with or without few hairs (cilia) (Fig. 2,m5)
vi. glands [pull off petals and sepals]	blood-red; evident through flowering and until fruits are fully formed but still immature	green
vii. stamens	filaments of fertile stamens (i.e. with pollen-producing anthers) widened near base, but lacking teeth apex of sterile filaments acute, filaments usually reddish	filaments of fertile stamens widened near base, and with a tooth on each side apex of sterile filaments often broad and bifid, or narrowed and $\pm$ acute, or with a marginal tooth on one side near apex
FRUIT		
i. body of fruit	glands absent from apical pit and furrow (Fig. 3,c1)	glands present in apical pit and furrow (Fig. 3,m1)
ii. awn or beak	mid- to dark brown, but lighter shade than in <i>E. moschatum</i> ; long protruding hairs whitish, 5-8; short hairs whiter, thicker, and with more abruptly acute tips than in <i>E. moschatum</i>	dark brown to blackish: long protruding hairs $\pm$ darkly pigmented, 7-10; short hairs usually more darkly pigmented and with more gradually acute tips than in <i>E. cicutarium</i>
<i>Seedling stage (incl. young rosettes): cotyledons present</i>		
COTYLEDONS	cotyledons of broad shape, 3-lobed, with single notch on each side, notch from less than $\frac{1}{4}$ to $\frac{3}{4}$ distance to centre line (Fig. 3,c2) cotyledons dark green	cotyledons of narrow shape, with distinct terminal lobe, notched on one or both sides, and usually 1, 1 $\frac{1}{2}$, (or 2) pairs of lateral lobes (pinatifid) (Fig. 3,m2) cotyledons lighter and brighter green than in <i>E. cicutarium</i>

Fig. 3: *Erodium cicutarium* — c1A, fruit, showing body, awn or beak, and long hairs; c1B, apex of body of fruit, showing absence of glands in apical pit and furrow; c2, cotyledon and stalk; c3, fused stipules of young leaves; c4, apex of sepal, showing prominent apical bristles;

Erodium moschatum — m1A, fruit, showing body, awn or beak, and long hairs; m1B, apex of body of fruit, showing glands in apical pit and furrow; m2, types of cotyledons, with stalks; m3, fused stipules of young leaves; m4, apex of sepal, showing short apical bristle.

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	terminal lobe little, if at all narrower, than width across lateral lobes (Fig. 3,c2)	terminal lobe (segment) evidently narrower than width across pair(s) of lateral lobes, giving impression of an overall longer, narrower cotyledon (Fig. 3,m2) (in fact, width across lateral pair(s) of lobes of cotyledon in this species is $\pm$ same width as cotyledon in <i>E. cicutarium</i> — it is the narrow terminal lobe which gives impression of narrow cotyledon)
	cotyledon equally notched at base, or asymmetrical — with one or both lobes lying against or covering part of stalk of cotyledon	base of terminal lobe (segment) wedge-shaped or asymmetrical, but basal part of lateral lobes never lying against or covering stalk of cotyledon
	lateral lobes of cotyledons rounded	teeth of lower portion of terminal lobe, and apices of lateral lobe(s) acute, usually pointing out obliquely from central axis
	blood-red pigmentation on upper part of stalk and central zone of cotyledon about midrib	blood-red pigmentation lacking on upper part of stalk, mid-zone of terminal and lateral lobes of cotyledon
FOLIAGE LEAVES	tips of teeth of folded, unemerged leaves orange-red; tips of teeth of fully unfolded leaves green, lacking orange-red pigmentation:	tips of teeth of both folded and fully unfolded leaves orange-red:
	central axis of fully unfolded leaves, and central vein of lateral leaflets with blood-red or distinct dark pigmentation	central axis of fully unfolded leaves and central vein of lateral leaflets lacking blood-red or dark pigmentation
	line of hairs on upper surface short, dull pink, less prominent than in many plants of <i>E. moschatum</i>	line of hairs on upper surface of mixed length, $\pm$ whitish, rougher in appearance and more prominent than in <i>E. cicutarium</i>
STIPULES	fused with base of leaf stalk (petiole) and projecting as a small whitish or colourless, tooth-like projection on one or both sides (Fig. 3,c3)	fused with base of leaf stalk (petiole) and projecting as prominent wing-like projections on each side, appreciably larger and more apparent than in <i>E. cicutarium</i> (Fig. 3,m3)
	(leaves in rosette plants, $\pm$ 6 cm or greater diameter show breakdown (sloughing-off) of the free portion of the fused stipules, and development of the more characteristic, deltoid, free stipules which lie between the tightly packed leaf stalk bases in the centre of the rosettes)	

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