

Different forms of *Poa infirma*: What are we missing?

Early Meadow-grass (*Poa infirma*) was thought until only about 15 years ago to be largely restricted to Cornwall, the Scillies and the Channel Isles, but since the publication of the New Atlas (Preston, Pearman and Dine, 2002) has suddenly been recorded from scores of hectads south of a line between south Wales and south Lincolnshire, as well as on the Irish south coast (BSBI maps). It was once thought to be a coastal plant, but around half of these recent records have been inland, with numerous confluent inland hectads in Kent and the London area.

Although global warming has almost certainly contributed to a real spread of *Poa infirma* northwards and eastwards from its native range along the south coast, increased dispersal by traffic must also be a crucial factor. In Norfolk the species has been found in over 20 monads, most of them urban and inland, and many in car parks or other heavily trafficked man-made habitats.

Most of these 21st century records have been made in the last 5 years or so, and we can now find *Poa infirma* populations almost at will in Norwich, with increasingly frequent records elsewhere as well. However, looking at the most recent national records across the south and Midlands, there are large gaps in the distribution in regions which have higher levels of traffic and larger urban centres than we have here, and so under-recording would still seem to be taking place. What could be the reasons for this?

Recognising *Poa infirma*

Three main reasons for under-recording come to mind: first and foremost not being aware of the right spotting features; secondly not looking in the right habitats; and thirdly, not examining suspicious *Poa annua*-like plants early enough in the year.

Procumbent pavement forms of *P. infirma* and *P. annua*; Wroxham (vc 27); Bob Leaney.



Left: Tiny genotype of *P. infirma*, with short, proportionately broad, pale-green leaves, culms 1.5-3cm long and narrow, dense panicle.



Right: 'Pavement form' of *P. annua* with dark-green leaves, and large spikelets.

As regards search image, it may be relevant that available illustrations (Clapham, Tutin & Warburg, 1965; Hubbard, 1984; Cope & Gray, 2009) all show *P. infirma* as quite a tall, erect plant, with fairly long panicle branches and a culm length much as in *P. annua*. In fact nearly all the examples we have found have been minute, with culms only 1.5-3cms long, and with very short branched, contracted panicles. The habit of our plants is also quite different from that usual in *Poa annua*, for the leaves are strikingly short and proportionately broad and the whole plant, including the culms, more or less appressed to the ground, with the culms radiating outwards when viewed from above (see photograph). Most plants have a striking yellow-green colouration, by far the most useful spotting character.



Close-up of right hand plant: showing post anthesis spikelets with elongating rachillae, best seen on left of image (4 spikelets, each with 3-4 florets)

P. infirma, procumbent and upright forms from same population; Central Norwich (vc 27); note pale green leaves and very small spikelets.



Typical upright form of *Poa annua*: long culmed plant with long patent-reflexed panicle branches, especially near base



Short culmed pavement form of *Poa annua* with dark green leaves; only 1 panicle (top right) with long patent reflexed branches

Most authorities describe *P. infirma* as being a plant of sandy places, dunes, cliff tops and paths, (especially trampled grassy paths), in semi-natural communities, usually near the sea (see Stace, 2019). Our experience in Norfolk has been that sites are as likely to be inland as on the coast and are mostly in man-made habitats, hardly ever occurring on “proper soil” or sand, but much more likely to be found in pavement cracks, in depressions on eroded concrete, or on gravelly or cindery substrates at the edge of car parks, urban road sides, or industrial estates. An especially favoured site is in the depressions between the flint cobbles on decorative paving, where just enough road-silt and organic debris can collect to support *P. infirma*, but where virtually nothing else is able to survive. Recently, we have found a few large populations in rural areas on thinly silted concrete such as ‘sugar-beet pads’.

As regards flowering season, whereas *P. annua* can flower in any month, *P. infirma* is only to be found over a very restricted period, from late February through to early May in our region.

Upright and prostrate forms of *Poa infirma*

The above observations on spotting characters for *P. infirma* apply also to plants found in Suffolk, where they are described as only about 1cm high, pale yellow-green, flattened and with short panicle branches (Sanford, 2010). It would seem that the main genotype in our region is capable of germinating in the late winter or early spring despite our more continental climate, but only in (comparatively) warm, shallow deposits overlying gravel, stone or concrete. However the small size, procumbent habit and narrow panicle shape, with short panicle branches, would seem to be partly phenotypic, due to nutrient deficiency associated with such a minimal growth medium - a large population of this form found in central Norwich, growing in the depressions of a cobbled pavement, had a few large, erect plants with broad panicles and longer panicle branches, growing in deeper ‘soil’ collected against a telephone box (see photos).

Alan Leslie (pers. comm.) also feels that there are two genotypes in Cambridge; the predominant one being tall and erect with a broad diffuse panicle and the other like those described above for Norfolk and Suffolk. He took one of the procumbent, tiny plants and transplanted it into his garden, where it grew tall and erect, with a broader, long-branched panicle.

Large, usually, erect plants, with long patent to ascending panicle branches, would seem to be the norm south of London and have been described from Middlesex (see illustration in Spencer, 2020). In the last year I have found two such populations for the first time, in central Norwich, one on street cobbles and the other at the base of a wall. These plants were growing in much the same nutrient poor conditions as the tiny narrow paniced forms found up to now, so I think were a different genotype.

Spotting characters

The two genotypes require quite different search images. Botanists in East Anglia and the Midlands will probably find more *P. infirma* by looking for tiny, procumbent, pale yellowish-green plants; *Poa annua* can have a very similar habit when growing in pavement cracks and other such sites, but the leaves are darker green and longer and the panicles much longer-branched when fully open (which they are often not). Further to the south and west, the taller genotype with a broader and more diffuse panicle is a more likely find; this form should again be more yellowish-green than *P. annua* but differs in its finer stems, patent to ascending rather than patent-reflexed panicle branches and tiny translucent spikelets.

Confirmatory characters

In the field one can provisionally confirm *P. infirma* by looking at spikelet characters with a x10 lens. The spikelets of *P. annua* are nearly always 4-5 flowered with tightly packed opaque green florets often with a purplish zone near the scarious lemma tip. In contrast those of *P. infirma* usually have (2) 3-4 florets which are loosely arranged, translucent and greenish-buff in colour.

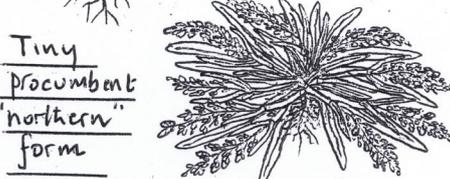
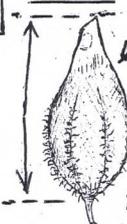
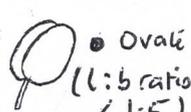
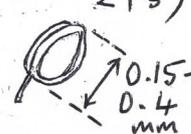
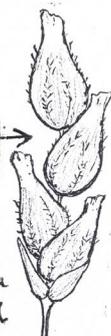
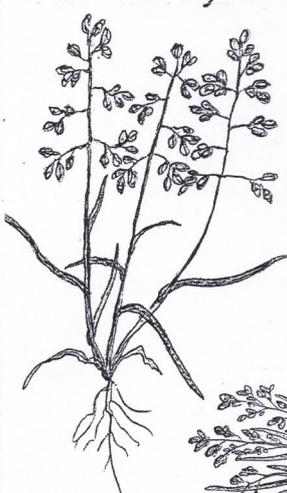
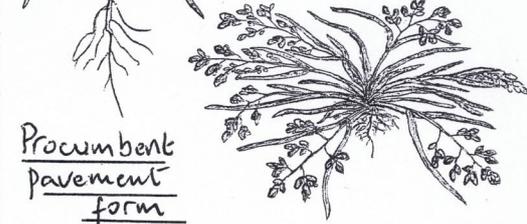
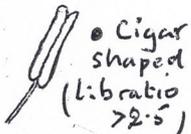
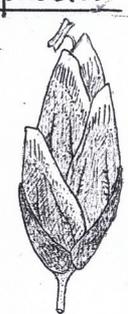
The best confirmatory feature for *Poa infirma* in the field is anther shape: egg shaped and scarcely longer than wide in *P. infirma*; cigar shaped in *P. annua*. The anthers may be very difficult to find because they often remain hidden in the hooded tip of the lemma, but one or two can usually be found on any one plant, and they can always be teased out from the lemma tips under a microscope.

Until one has seen *P. infirma* many times, one should always take a plant home for microscopic examination and measurement of the ‘floral parts’. Lemma length and anther length are especially useful, without any

overlap in both cases (see Cope and Gray, 2009; Stace, 2019). Under the microscope one can more easily see the hairy, papery thin translucent lemmas, with florets that are non-imbricate (not folded inside each other at the base) – often with the florets so separated that one can see the rachillae beneath the 2nd or 3rd floret.

In the erect 'southern' form of *Poa infirma* the rachilla elongates after anthesis and the florets become strung out distantly along its axis (see drawings). This appearance, shown in the Hubbard and BSBI Handbook illustrations, is very characteristic, but should not be expected earlier on. As this elongation of the spikelet rachilla takes place the narrowly ascending panicle branches also elongate enormously, so that the panicle takes on an entirely different appearance.

Visual Key

<p>POA INFIRMA</p> <p><u>Erect "southern" form</u></p>  <p><u>Tiny procumbent "northern" form</u></p> 		<p>Field characters</p> <ul style="list-style-type: none"> • Yellow-green leaves and tiny branched greenish-buff spikelets • Erect form has longish leaves & patent-ascending panicle branches • Procumbent form has very short leaves & dense lauceolate panicle. 	<p>Floret</p>  <p>• Lemma veins long hairy to > 1/2 way up</p> <p>• Lemmas pale translucent greenish-buff.</p> <p>Lemma length 1.8 - 2.3 mm</p>	<p>Ovale</p>  <p>• (l:b ratio < 1.5)</p> <p>Anthers</p>  <p>• 0.15 - 0.4 mm</p>
		<p>Spikelet</p> <ul style="list-style-type: none"> • Rhachilla elongating post anthesis • Floret bases hardly overlapping often with exposed rachilla • Usually 3-4 flowered 	<p>At anthesis</p> 	<p>Post anthesis</p> 
<p>POA ANNUA</p> <p><u>Typical erect form</u></p>  <p><u>Procumbent pavement form</u></p> 		<p>Field characters</p> <ul style="list-style-type: none"> • Long dark green leaves • Panicles broadly triangular with patent-reflexed basal branches • Spikelets large opaque silvery green 	<p>Floret</p>  <p>• Lemmas opaque silvery green</p> <p>• Lemma veins sparsely short hairy only at base.</p> <p>Lemma length 2.5 - 3.8 mm</p>	<p>Anther</p>  <p>• Cigar shaped (l:b ratio > 2.5)</p> <p>• 0.6 - 1.1 mm</p>
		<p>Spikelet</p>  <p>• Lemma bases overlapping at base</p> <p>• Usually (3) 4-6 flowered</p>		

References

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