
SD5

Leymus arenarius mobile dune community

Synonymy

Ammophiletum arenariae Tansley 1911, 1939 *p.p.*; *Elymo-Ammophiletum arenariae* Br.-Bl. & De Leeuw 1936 *p.p.*; *Leymus arenarius* consociet Bond 1952; *Ammophila arenaria* stands Gimingham 1964a *p.p.*; *Potentillo-Elymetum arenariae* (Raunkiaer 1965) Tx. 1966 *sensu* Birse 1980.

Constant species

Leymus arenarius.

Physiognomy

The *Leymus arenarius* community consists of open to locally dense stands of dune vegetation dominated by the tall and tussocky perennial grass *Leymus arenarius*. It is a rhizomatous plant, able to colonise and fix mobile sand and keep pace with substantial accumulation by upward and outward extension of its stout buried stems, such that the robust glaucous shoots, often well over 1 m high, can be found emerging from dunes that have grown to several metres tall (Trail 1904, Bond 1952).

No other species is constant throughout, but *Elymus farctus* is locally common, invading foreshore sand ahead of or together with the *Leymus* and sometimes remaining as a subsidiary and shorter element to the cover here, though only thickening up in vegetation which is best regarded as transitional to *Elymus farctus* foredunes. *Ammophila arenaria* is likewise never a prominent feature here, but it is a characteristic colonist of wind-blown sand along with or subsequent to *Leymus* and can be found as an occasional in the community, going on to exceed the lyme grass in frequency and abundance among the various kinds of *Ammophila* dunes. Then, in some stands, *Festuca rubra* is quite common with *Elymus repens* sometimes marking out places where there has been incorporation of organic detritus.

Other associates are sparse, and are mostly strandline plants persisting among the developing dunes. Patches of *Honkenya peploides* occur occasionally, for example, and there may be scattered individuals of *Cakile marit-*

ima, *Atriplex prostrata*, *A. glabriuscula*, *Sonchus arvensis*, *S. asper*, *Cirsium arvense*, *Galium aparine* and *Rumex crispus*, but sand accretion rapidly overwhelms the more vulnerable of these. Where somewhat more stable patches of ground develop, species such as *Cerastium fontanum*, *Hypochoeris radicata*, *Poa pratensis*, *Taraxacum officinale* and some bryophytes can figure in small amounts.

Sub-communities

Species-poor sub-community. In many stands of this sub-community, there is nothing but *Leymus*, sometimes sparse in newly-colonising or moribund vegetation, in other cases very vigorous and dense. Even where other species are found, there is no real consistency in their occurrence, although big patches of *Honkenya* can be a distinctive feature where this vegetation is developing close to the strandline, with tussocks of *Ammophila* occasionally colonising stands further up the beach.

***Elymus farctus* sub-community.** Although *Leymus* remains a clear dominant here, small amounts of *E. farctus* are a constant feature, with very occasional *Honkenya*, *Atriplex prostrata*, *Sonchus arvensis* and *Ammophila*.

***Festuca rubra* sub-community:** *Potentillo-Elymetum arenariae* (Raunkiaer 1965) Tx. 1966 *sensu* Birse 1980. *E. farctus* can be occasional in this sub-community too, but much more characteristic is the high frequency of *Festuca rubra* beneath the *Leymus*, thickening up in places where the canopy of the dominant is a little less dense. Some other grasses also play a minor role in the ground cover, with *Elymus repens* quite common, *Poa pratensis* and *Holcus lanatus* more sparse, and *Ammophila* again occurring as scattered tussocks in some stands. Among the dicotyledons, *Sonchus arvensis* is especially frequent, with *Atriplex glabriuscula* often commoner than *A. prostrata*, and occasional plants of

Cirsium arvense, *Cakile*, *Sonchus asper* and, on more consolidated sand, *Cerastium fontanum*, *Hypochaeris radicata* and *Taraxacum officinale*. It is among this kind of *Leymus* vegetation, too, that bryophytes can make a sparse contribution, with records for *Brachythecium rutabulum*, *Ceratodon purpureus*, *Tortula ruralis* ssp. *ruraliformis* and *Bryum algovicum* ssp. *rutheanum*.

Habitat

The *Leymus* community is a locally important early colonising vegetation of wind-blown sand above the strandline and on young dunes around the more northerly coasts of Britain.

Leymus is an Oceanic Northern plant (Matthews 1955), widely distributed around the seaboard of north-west Europe with occasional apparently natural stations inland, though not in Britain. The true southern limits of its range are uncertain, but it has been reported only as a casual or an introduction from Portugal and around the Mediterranean (Tutin *et al.* 1980), and is probably restricted at lower latitudes by the warmer and drier climate. In Britain, too, it is noticeably more common and abundant around our cooler and more humid northern shores, being rare on or altogether absent from some major dune systems in the south and west of the country, though successfully planted at certain localities in Cornwall and Sussex (Bond 1952, Perring & Walters 1962). The community becomes locally prominent in moving up the Irish Sea coast, but it is on our somewhat more sheltered eastern shores that its increasing contribution towards the north is more obvious, particularly from Northumberland up into Scotland, Orkney and Shetland. Even at some places in these parts of the country, though, there is evidence or suspicion of planting (Bond 1952).

In Britain, *Leymus* is almost exclusively a colonist of sandy substrates, occurring only very occasionally on coarser beach material (Tansley 1939), a preference which probably restricts its invasion along some shores within its overall range, as around much of the north-west Scottish mainland. It can colonise from seed (Graham 1938) or from rhizome fragments, even small ones (Bond 1952), readily getting a hold in patches of sand that have accumulated around strandline plants or their remains, in slight hollows along the beach top and on already established foredunes. Here, its habitat overlaps considerably with that of *E. farctus*, and the *Elymus* sub-community contains those stands where this smaller grass has not been overwhelmed by sand accretion. In general, however, *Leymus* does not seem to extend as close to the tidal limit as does *E. farctus* (Turner 1977), perhaps because of the greater vulnerability of its taller shoots to physical damage by wind (Bond 1952).

It has also been suggested that the *Leymus* community prefers sands rich in organic matter (Géhu & Géhu 1969). Certainly, the *Festuca* sub-community is espe-

cially associated with sites where seaweed and other debris has been deposited on or incorporated into the surface of the beach (Birse 1980), the varied associated flora of ephemerals and weedy herbs reflecting the nutrient-rich conditions. The short extension inland of *Leymus* vegetation along the sandy banks of some streams that debouch on to the foreshore has also been adduced as evidence of a nitrophilous tendency in the grass itself (Bond 1952), as well as for its tolerance of more brackish conditions (Géhu & Géhu 1969).

Sand accumulation among *Leymus* tussocks is not always a progressive phenomenon and bouts of wind erosion, exceptional high tides or storm surges can set back the process. Where accretion is more rapid, however, and where there is no replenishment of drift detritus, any strandline survivors are quickly overwhelmed, the Species-poor sub-community tending to develop. There is some evidence that the buds of *Leymus* themselves are swamped by a covering of only 6–8 cm of sand (Ranwell 1959), but internode differentiation during autumn and winter and rhizome elongation in spring and summer seem to be paced according to the rate of deposition, such that growth can keep up with considerable increase in height of the developing dunes, with new buds being differentiated at the base of the current year's shoots ready for extension upwards and outwards in the following season (Bond 1952). Provided the water supply remains adequate and the dune system stays stable, the *Leymus* community appears to retain its vigour on sand hills up to 5 m high (Trail 1904, Bond 1952).

Zonation and succession

In many dune systems, particularly in southern and western Britain, *Leymus* has at most a minor role among younger dunes carrying the *Elymus farctus* and *Ammophila* communities but, along those coasts where *Leymus* vegetation is better developed, it usually dominates in a more or less well-defined zone between these two other assemblages, or tends to replace the *Ammophila* community as the most important builder of mobile dunes. In some areas, the *Leymus* community has increased its extent considerably within living memory but, even where it forms part of more extensive sequences, backed by other vegetation types on shifting or fixed dunes, such zonations do not necessarily represent straightforward successional developments.

Through much of its range, *Leymus* vegetation occurs in close association with the *Elymus farctus* foreshore community, sometimes replacing it in a clear zonation with a shift a little way up the beach away from the strandline with its more severe bouts of wind erosion and tidal disturbance, in other cases occurring intermixed with it in a complex linear mosaic over small foredunes running along the shore. Floristically, the two assemblages intergrade continuously through the *Elymus* sub-community

of the *Leymus* vegetation, but changes in dominance from the one grass to the other effectively distinguish them, the *E. farctus* community also generally retaining a more consistent scattering of strandline survivors like *Honkenya*, *Cakile* and *Atriplex* spp.

Where *Ammophila* also invades mobile sand in which *Leymus*, and sometimes *E. farctus* too, have got a hold above the limit of even the extreme tides, the zonations are more complex. In such situations, the *Leymus* community may give way behind to a distinct zone of *Ammophila* vegetation on bigger shifting dunes, but there can be transitional stretches where *Leymus* remains as an important subsidiary element among the marram. This *Leymus* sub-community of the *Ammophila* vegetation has been recorded in these sequences at scattered localities up the east coast of Britain and occasionally on western shores. In other places, particularly over fore-dunes along the Lincolnshire and Humberside coasts and more locally in Northumberland, *E. farctus* also plays a prominent role right through a compressed zonation, with the *Leymus-Elymus* sub-community of *Ammophila* vegetation occurring behind the *Elymus* type of *Leymus* dune.

In shifting further north up the eastern coast of Britain, the *Leymus* community tends to become more important among the vegetation of the younger mobile dunes, giving way behind to the somewhat more stable kinds of *Ammophila* assemblage, of the *Festuca* and *Poa* sub-communities, on sand that is a little more fixed. *Leymus* can persist as an occasional there and the *Festuca* sub-community of *Leymus* vegetation, with its scattered plants of *Elymus repens*, *Sonchus arvensis* and *Hypochoeris radicata* sometimes forms a transitional zone. But, eventually, such lyme grass as has not been overwhelmed by sand accretion loses its vigour and dies out, the plant hardly ever extending into the *Ammophila-Poa* or *Festuca-Galium* communities that cover much of the fixed sand of dunes and stretches of machair around our northern coasts.

Distribution

The *Leymus* community is scarce around our southern shores from Suffolk to North Wales, but it occurs at

scattered localities around the Irish Sea and becomes increasingly common up the east coast, especially from Northumberland into Scotland.

Affinities

It has not been customary, in either descriptive or phytosociological schemes, to recognise a distinct *Leymus* dune community, stands with abundant, even dominant, lyme grass being subsumed into the kind of *Ammophiletum* of mobile dunes familiar from Tansley (1911, 1939) or its equivalent in Continental classifications, the *Elymo-Ammophiletum* (Braun-Blanquet & de Leeuw 1936, Birse 1980, 1984), where *Leymus* is considered a good indicator of the cool, oceanic conditions of the north-west European seaboard (Géhu & Géhu 1969). Some authors, however, have acknowledged the existence of pure *Leymus* stands in Britain (Bond 1952, Gimingham 1964a) and it seems sensible to retain a separate unit for that vegetation in which the plant is overwhelmingly abundant, parallel to the *Ammophila* community, intergrading with it, though extending closer to the tidal limit and having a distinctly northern distribution around our coasts. Such vegetation type could readily take in transitions to *Elymus farctus* foredunes and also the swards described from drift-rich Scottish shores by Birse (1980) as part of the *Potentillo-Elymetum arenariae* (Raunkiaer 1965) Tx. 1966, an association with clear affinities with the inundation communities of the *Elymo repentis-Rumicion*. As defined here, the *Leymus* community is best placed with our *Ammophila* vegetation of mobile sands in the *Ammophilion borealis*, the alliance of assemblages from younger coastal dunes. An alternative view would stress the occurrence of *Leymus* on often drift-enriched foreshores and locate it with other strandline communities in a *Honkenyo-Crambion* (Géhu & Géhu 1969), which White & Doyle (1982) thought sensibly placed in the *Honkenyo-Elymetea arenariae*, a class created by Tüxen (1966) to accommodate maritime inundation vegetation, with *Leymus arenarius* as a characteristic species. This would hardly be borne out by the behaviour of the plant in Britain.

Floristic table SD5

| | a | b | c | 5 |
|-------------------------------------|---------|---------|-----------|-----------|
| <i>Leymus arenarius</i> | V (7–9) | V (5–8) | V (2–9) | V (2–9) |
| <i>Elymus farctus</i> | | V (3–7) | II (1–5) | III (1–7) |
| <i>Honkenya peploides</i> | I (5–6) | I (3) | | I (3–6) |
| <i>Festuca rubra</i> | | | V (1–8) | II (1–8) |
| <i>Sonchus arvensis</i> | I (1–4) | I (1–2) | III (1–5) | II (1–5) |
| <i>Elymus repens</i> | I (2–5) | | II (3–5) | I (2–5) |
| <i>Atriplex glabriuscula</i> | I (4) | | II (1–5) | I (1–5) |
| <i>Cakile maritima</i> | | | I (1–4) | I (1–4) |
| <i>Cirsium arvense</i> | | | I (1–3) | I (1–3) |
| <i>Hypochoeris radicata</i> | | | I (1–5) | I (1–5) |
| <i>Poa pratensis</i> | | | I (2–5) | I (2–5) |
| <i>Bryum algovicum rutheanum</i> | | | I (2–5) | I (2–5) |
| <i>Taraxacum officinale</i> | | | I (1–3) | I (1–3) |
| <i>Epilobium angustifolium</i> | | | I (2–4) | I (2–4) |
| <i>Holcus lanatus</i> | | | I (1–2) | I (1–2) |
| <i>Sonchus asper</i> | | | I (1–3) | I (1–3) |
| <i>Brachythecium rutabulum</i> | | | I (3–5) | I (3–5) |
| <i>Ceratodon purpureus</i> | | | I (1–5) | I (1–5) |
| <i>Tortula ruralis ruraliformis</i> | | | I (4–5) | I (4–5) |
| <i>Atriplex prostrata</i> | I (6) | I (1–2) | I (1–2) | I (1–6) |
| <i>Ammophila arenaria</i> | I (7) | I (5) | I (5) | I (5–7) |
| <i>Cerastium fontanum</i> | I (1) | | I (1–2) | I (1–2) |
| <i>Galium aparine</i> | I (1) | | I (1) | I (1) |
| <i>Elymus pycnanthus</i> | | I (2) | I (2) | I (2) |
| <i>Rumex crispus</i> | | I (1) | I (1) | I (1) |
| Number of samples | 7 | 6 | 15 | 28 |
| Number of species/sample | 2 (2–5) | 3 (2–5) | 8 (4–17) | 5 (2–17) |

a Species-poor sub-community

b *Elymus farctus* sub-communityc *Festuca rubra* sub-community5 *Leymus arenarius* mobile dune community (total)

