
SD18

Hippophae rhamnoides dune scrub

Synonymy

Hippophae rhamnoides scrub Tansley 1911; *Hippophaëtum* Tansley 1939; *Hippophaë* communities Pearson & Rogers 1962; Dune scrub Gimingham 1964a p.p.

Constant species

Hippophae rhamnoides.

Rare species

Hippophae rhamnoides.

Physiognomy

Hippophae rhamnoides occurs sparsely and at low cover in a variety of vegetation types of less mobile dune sands, but the *Hippophae* scrub includes stands where this thorny, deciduous shrub is becoming a consistent and more prominent feature. The density and height of the bushes is, however, very variable. At one extreme, the community includes grassier vegetation where the buckthorn is scattered and of only moderate cover overall, whereas other stands have a very thickly-set mass of suckering stems with a virtually impenetrable canopy of the stiff branches. Exceptionally, the bushes can attain over 3 m in height but 1–2 m is more usual and, in more exposed situations, the cover may be severely wind-trimmed.

The extent and character of the associated flora is very much dependent on the degree of *Hippophae* dominance, and no other species are constant throughout the community. Interestingly, the most frequent dune grass overall is *Elymus pycnanthus*, but there is quite commonly some *Poa pratensis* and *Holcus lanatus*, with more occasional *Agrostis stolonifera*, *Dactylis glomerata* and *Carex arenaria*. The most widely distributed dicotyledon is *Senecio jacobaea*, with *Cirsium arvense*, *Sonchus arvensis*, *Epilobium angustifolium* and *Heracleum sphondylium* occurring more rarely but with local abundance. *Rubus fruticosus* agg. is also fairly frequent and can thicken up in places among and around the buckthorn.

Grasses such as *Ammophila arenaria*, *Festuca rubra* and *Leymus arenarius* tend to persist only in the earlier stages of *Hippophae* invasion, though there they can be very common and abundant and, along with a variety of more occasional dune herbs, provide strong continuity with the vegetation being colonised. In denser stands, however, these plants become much scarcer, the associated plants thinning out beneath the canopy but providing a distinctively weedy and nitrophilous aspect around the bushes.

Sub-communities

***Festuca rubra* sub-community:** Open *Hippophae* community Pearson & Rogers 1962. Here, the *Hippophae* bushes are usually more scattered and small, and not yet densely suckering, providing a cover that is generally less than 50%. Between the buckthorn, there is grassy vegetation, often rank and sometimes strongly tussocky, typically dominated by mixtures of *F. rubra* and *Ammophila*, with locally abundant *E. pycnanthus* and, preferential at low frequencies here, *Leymus* and *E. farctus*. Along with scattered *S. jacobaea* and *C. arvense*, there are occasional plants of *Ononis repens* with, in more open places, *Hypochoeris radicata*, *Plantago lanceolata*, *Taraxacum officinale* and *Leontodon taraxacoides*. Even some strandline plants, such as *Honkenya peploides* or *Cakile maritima*, can occur where there are still patches of mobile sand and, on more stable bare areas, there can be ephemerals like *Cerastium diffusum* ssp. *diffusum*, *C. semidecandrum*, *Aira praecox* and *Phleum arenarium*, patches of *Brachythecium albicans* and *Ceratodon purpureus* or thalli of various *Cladonia* spp.

***Urtica dioica*-*Arrhenatherum elatius* sub-community:** Dense *Hippophae* community Pearson & Rogers 1962. In this kind of *Hippophae* scrub, the cover of the bushes is rarely less than 50% and usually much denser, with patches of continuous canopy and small areas of open ground between. In these, most of the characteristic

dune plants of the *Festuca* sub-community are very poorly represented and in their place are patches of *Urtica dioica* and *Arrhenatherum elatius* with trailing masses of *Galium aparine* and *Solanum dulcamara*. *Cirsium vulgare*, *Stellaria media*, *Montia perfoliata* and *Poa trivialis* occur along with *S. jacobaea*, *C. arvense*, *E. angustifolium* and *Heracleum* though, among the densest buckthorn, only very frail individuals of the most shade-tolerant species survive among sparse wefts of *Brachythecium rutabulum* and *Eurhynchium praelongum*. In places, the canopy is enriched by bushes of *Sambucus nigra* or, more rarely, *Crataegus monogyna*.

Habitat

The *Hippophae* scrub is a local feature of less mobile dune sand at scattered localities around the British coast, also occurring very occasionally on soft sea-cliffs. It is a natural vegetation type along the east and south-east coasts, but has developed elsewhere from planted stock, and could probably establish on all but the most acidic dunes.

H. rhamnoides ssp. *rhamnoides* has an extensive distribution through the mountains of southern Europe and central Asia, but occurs as a coastal plant in north-west Europe from Brittany to north Norway and the Baltic (Pearson & Rogers 1962). It has been native with us since the Late Glacial (Godwin 1975) but its natural localities appear to be concentrated between east Sussex and Humberside with a few stations northwards to the Lothians (Perring & Walters 1962). Elsewhere, it has become widely naturalised and there is probably no climatic hindrance to its survival anywhere around our coasts or indeed in the kind of inland river gravel habitat that it favours through its Eurasian range.

Hippophae is able to colonise dune sand as it becomes more fixed in the later stages of *Ammophila* dominance. Initial invasion may be by seed because, though the species is dioecious, fruiting can be prolific and bird-dispersal could transport the seed some distance. Germination requires a cold pre-treatment, but such a need is generally met in early winter and viability can be very high. Once established, however, vegetative reproduction is the more important means of local spread, an extensive network of horizontal roots putting up aerial shoots, irregularly spaced but often clustered, which can grow rapidly and produce a densely branching canopy.

Young plants can withstand some accretion, so long as they are not completely buried, and will respond to deposition by putting out new adventitious roots into the drifting sand. *Hippophae* is also resistant to drought, the bushes eventually producing roots which penetrate deeply and often make contact with moist layers of sand (Pearson & Rogers 1962). On the other hand, periodic flooding does not seem to damage established colonies and this kind of scrub can be found in some winter-wet

dune hollows. The bushes are resistant to wind-cut and mature foliage is not damaged by sea-spray, though growth is often noticeably better in sheltered situations and colonies are often centred in depressions between ridges and over the lee faces of dunes.

The floristic character of younger and more open stands is largely inherited from the invaded vegetation, generally some form of the *Ammophila-Festuca* community, where marram is still vigorous but often accompanied by *F. rubra* and *P. pratensis* and, locally down the east coast, by *Leymus*. It is thus these grasses, together with their associated dicotyledons from the dune swards, that give the distinctive stamp to the *Festuca* sub-community.

The buckthorn is easily able to compete with the rank grassy cover of the invaded vegetation by putting up its vigorous suckers and, as the bushes thicken up, the dune flora becomes increasingly confined to enclaves and is then largely shaded out. The flora of the *Urtica-Arrhenatherum* sub-community thus consists of the rather sparse survivors from this earlier phase, together with new plants tolerant of the shady scrub margins and able to benefit from the protection from grazing that the bushes provide. Among these, the prominence of plants like *U. dioica*, *G. aparine*, *Arrhenatherum* and *Sambucus* reflects the more eutrophic soil conditions that seem to be characteristic of denser *Hippophae* stands. Nitrogen is significantly greater in the substrates of such vegetation than in the surrounding sands (Pearson & Rogers 1962) and, though some of this may derive from steady accumulation of humus with the ageing of the fixed sediments, much may come from fixation of atmospheric nitrogen in root nodules on the buckthorn (Bond *et al.* 1954, 1956). Such nodules develop within a matter of weeks when seedlings are grown in soil with a suitable inoculum, though the exact nature of the mycorrhizal organism is uncertain (Pearson & Rogers 1962). Beneath the denser stretches of *Hippophae* canopy, of course, the beneficial effects of soil enrichment on the associated flora are largely offset by the deep shade, but the elements of a sparse woodland flora may appear with time.

Seedlings of *Hippophae* are eaten by rabbits and such grazing may be effective in preventing the establishment of the shrub from seed: after myxomatosis, buckthorn rapidly got a hold in some sites (Dargie in Shimwell 1971c) and the demise of rabbits may have played a major role in the recent spread of this vegetation. Older bushes, though, are well-armed with thorns and their leaves appear bitter to stock, so stands often show few signs of predation and may be difficult to keep in check. However, mowing young shoots can reduce them to a prostrate mat of contorted shoots and ploughing or ditching can prevent the spread of the roots. The stabilising effect of this scrub on dunes, the protection from wind that it can afford to tree saplings and the decorative

character of the foliage and fruit have favoured the widespread use of the shrub for coastal defence, shelter and screening, but such plantings quickly get a natural look and may become troublesome.

Zonation and succession

The *Hippophae* community is usually found in mosaics with dune grasslands, weedy tall-herb vegetation and other kinds of scrub developed over less heavily grazed stretches of fixed sands. It develops as a part of natural successions in its east coast localities, elsewhere as an introduction, and, where it is not overtopped, it could perhaps have a measure of stability in more exposed habitats. However, many of our stands are too young for us to know what the end product of this succession might be.

Although *Hippophae* scrub can extend on to quite mobile sands carrying the *Ammophila* community, it is commonly seen among *Ammophila-Festuca* vegetation on somewhat more stable sediments. Then, there can be a continuous gradation between the *Festuca* sub-community of the scrub and the dune swards around, mixtures of *Ammophila*, *F. rubra* and *P. pratensis* assuming dominance away from the buckthorn bushes. *Leymus* can be prominent in the dune vegetation, too, and at some localities along the Lincolnshire and Norfolk coasts, there is a local abundance of *Elymus pycnanthus* throughout the zonation. Where the *Hippophae* cover thickens, the *Festuca* sub-community can then give way to the *Urtica-Arrhenatherum* sub-community.

In certain sites, this basic pattern is complicated by the occurrence of *Ammophila-Arrhenatherum* grassland, the *Arrhenatherum* sub-community of which can grade into both the *Ammophila-Festuca* dune vegetation with the disappearance of *Arrhenatherum*, *Dactylis glomerata*, *Heracleum* and *Cirsium arvense* or into denser patches of scrub with the appearance of clumps of *Urtica* and tangles of *G. aparine* and *Solanum*. The *Arrhenatherum* plants may also provide continuity with stands of *Rubus-Holcus* underscrub where brambles dominate among mixtures of rank grasses and weedy herbs, or there may be stands of tall-herb vegetation

dominated by *Urtica* or *Epilobium angustifolium*. Then, locally, the occasional bushes of *Sambucus* seen among the *Hippophae* may thicken up with transitions to *Crataegus-Hedera* or *Prunus-Rubus* scrub from among which the buckthorn is eventually shaded out. With time and shelter from winds, it is possible that such scrub on dunes progresses to Carpinion woodland but even our *Hippophae* scrub still seems to be in an immature state compared with, for example, Dutch stands and we have little information about what the natural successions beyond buckthorn stands might be.

Distribution

The community is well established on the east coast between Kent and Fife, especially in Lincolnshire and north Norfolk, and has become firmly naturalised elsewhere, as at Formby-Ainsdale in Lancashire, at scattered sites between Devon and Cromarty and, more recently, in Wales.

Affinities

The distinctive role of *Hippophae* as a colonist of dunes was early recognised (Tansley 1911, 1939) and the study of Pearson & Rogers (1962) characterised the two kinds of scrub distinguished here. Compared with the buckthorn vegetation described from the Dutch coast, however, our own stands seem immature. The *Festuca* sub-community is similar to a *Hippophae-Ammophila* assemblage which van der Maarel & Westhoff (1964) thought a precursor to the *Hippophaeo-Ligustrum* Meltzer 1941 *emend.* Boerboom 1960, a scrub with mixtures of *Hippophae*, *Ligustrum vulgare*, *Berberis vulgaris*, *Rhamnus catharticus*, *Euonymus europaeus*, *Crataegus monogyna* and *Rosa* spp. The *Urtica-Arrhenatherum* sub-community, on the other hand is more similar to the *Hippophao-Sambucetum* Boerboom 1960 where canopies of *Hippophae* and *Sambucus* are associated with a more nitrophilous suite of herbs. These kinds of vegetation have traditionally been placed among the scrubs of the Berberidion alliance in the Prunetalia (Westhoff & den Held 1969, Ellenberg 1978).

Floristic table SD18

	a	b	18
<i>Hippophae rhamnoides</i>	V (4–10)	V (3–10)	V (3–10)
<i>Festuca rubra</i>	V (3–9)	I (3–6)	III (3–9)
<i>Ammophila arenaria</i>	IV (3–9)	I (1–6)	III (1–9)
<i>Leymus arenarius</i>	II (1–4)	I (1–4)	II (1–4)
<i>Elymus farctus</i>	II (2–7)	I (5)	I (2–7)
<i>Hypochoeris radicata</i>	II (1–7)	I (1–2)	I (1–7)
<i>Taraxacum officinale</i> agg.	II (1–4)	I (1–2)	I (1–4)
<i>Plantago lanceolata</i>	II (1–4)	I (3)	I (1–4)
<i>Ononis repens</i>	II (2–7)		I (2–7)
<i>Leontodon taraxacoides</i>	I (1–5)		I (1–5)
<i>Cerastium diffusum diffusum</i>	I (1–2)		I (1–2)
<i>Daucus carota</i>	I (1–3)		I (1–3)
<i>Honkenya peploides</i>	I (1–5)		I (1–5)
<i>Brachythecium albicans</i>	I (3–6)		I (3–6)
<i>Salix repens</i>	I (3)		I (3)
<i>Aira praecox</i>	I (2–3)		I (2–3)
<i>Calystegia soldanella</i>	I (3–4)		I (3–4)
<i>Cerastium semidecandrum</i>	I (1–3)		I (1–3)
<i>Cerastium fimbriata</i>	I (1–3)		I (1–3)
<i>Ceratodon purpureus</i>	I (1–6)		I (1–6)
<i>Cladonia furcata</i>	I (1–3)		I (1–3)
<i>Achillea millefolium</i>	I (2–3)		I (2–3)
<i>Anacamptis pyramidalis</i>	I (2–3)		I (2–3)
<i>Phleum arenarium</i>	I (1–3)		I (1–3)
<i>Diplotaxis tenuifolia</i>	I (1–4)		I (1–4)
<i>Sagina procumbens</i>	I (3–5)		I (3–5)
<i>Urtica dioica</i>		IV (1–8)	III (1–8)
<i>Arrhenatherum elatius</i>	I (3–7)	III (3–9)	II (3–9)
<i>Galium aparine</i>	I (1)	III (1–4)	II (1–4)
<i>Solanum dulcamara</i>	I (1)	III (1–6)	II (1–6)
<i>Sambucus nigra</i>	I (3)	II (1–8)	I (1–8)
<i>Brachythecium rutabulum</i>	I (3–5)	II (2–6)	I (2–6)
<i>Cirsium vulgare</i>	I (1)	II (1–3)	I (1–3)
<i>Rubus caesius</i>		I (3–6)	I (3–6)
<i>Stellaria media</i>		I (2–5)	I (2–5)
<i>Montia perfoliata</i>		I (1–3)	I (1–3)
<i>Poa trivialis</i>		I (3–4)	I (3–4)
<i>Cynoglossum officinale</i>		I (1–2)	I (1–2)
<i>Crataegus monogyna</i>		I (3)	I (3)
<i>Glechoma hederacea</i>		I (3)	I (3)
<i>Senecio jacobaea</i>	III (1–6)	III (1–4)	III (1–6)
<i>Elymus pycnanthus</i>	II (1–7)	II (1–8)	II (1–8)
<i>Poa pratensis</i>	II (1–6)	II (1–6)	II (1–6)
<i>Cirsium arvense</i>	II (1–2)	II (1–6)	II (1–6)
<i>Rubus fruticosus</i> agg.	II (1–7)	II (1–7)	II (1–7)

Floristic table SD18 (cont.)

	a	b	18
<i>Holcus lanatus</i>	II (2–4)	II (2–5)	II (2–5)
<i>Epilobium angustifolium</i>	I (2–4)	I (2–6)	I (2–6)
<i>Sonchus arvensis</i>	I (1–5)	I (1–3)	I (1–5)
<i>Agrostis stolonifera</i>	I (5)	I (2–6)	I (2–6)
<i>Heracleum sphondylium</i>	I (1–3)	I (1–3)	I (1–3)
<i>Carex arenaria</i>	I (1–4)	I (5)	I (1–5)
<i>Dactylis glomerata</i>	I (1–4)	I (2–4)	I (1–4)
<i>Galium verum</i>	I (1–3)	I (2)	I (1–3)
<i>Eurhynchium praelongum</i>	I (3–4)	I (4–7)	I (3–7)
<i>Lotus corniculatus</i>	I (1–4)	I (3)	I (1–4)
<i>Phragmites australis</i>	I (5)	I (1–5)	I (1–5)
<i>Convolvulus arvensis</i>	I (3–5)	I (5)	I (3–5)
Number of samples	36	37	73
Number of species/sample	11 (3–25)	10 (4–25)	10 (3–25)

a *Festuca rubra* sub-communityb *Urtica dioica*-*Arrhenatherum elatius* sub-community18 *Hippophae rhamnoides* dune scrub (total)