

## The distribution and status of *Corynephorus canescens* (L.) P. Beauv. (Poaceae) in Britain and the Channel Islands with particular reference to its conservation

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### ABSTRACT

*Corynephorus canescens* (L.) P. Beauv. is considered to be a scarce plant in Britain. A description of the plant and its habitat are outlined with a brief account of each site. The local problems in the maintenance of the population at the inland site at Wangford in the W. Suffolk Breckland (v.c. 26) are discussed with accounts of conservation treatments.

**KEYWORDS:** conservation, sand accretion, *Carex arenaria*, pH range, vegetative spread.

### INTRODUCTION

*Corynephorus canescens* (L.) P. Beauv. (Poaceae) is considered to be a scarce plant (i.e. it occurs in 16–100 10-km squares) in Britain (Trist 1994). This paper is concerned with providing a description of the species and an up-date on its distribution including comments on its habitat, population maintenance and conservation measures.

### DESCRIPTION

A densely tufted glaucous perennial of variable life span, 5–30 cm high with fibrous roots. Culms mostly erect, 2–5 noded below the middle. Leaf sheaths inflated, light purple; ligules acute, 2–4 mm; blades numerous, glabrous, stiff, setaceous, inrolled, (1.5)–4–12 cm × 0.3–0.5 mm. Panicles narrow, open at flowering, later becoming dense, 0.8–7 cm × 0.5–1.5 cm, pale green or purple; branches short; pedicels 1–3 mm long. Spikelets lanceolate, compressed, 2-flowered, 2.5–4 mm long, breaking up at maturity below the lemma. Glumes narrow, lanceolate, acuminate, equal or almost so, light purple, membranous, slightly scabrid on the keel, with narrow white tips and margins. Lemmas enclosed by the glumes, 1.5–2 mm long, ovate, with a basal tuft of minute hairs and awned at the base. The awn has two parts, in the middle is a ring of hairs, the lower half is orange–brown and twisted when dry, the apex is club-shaped and is mainly enclosed by the glumes but 0.5–0.8 mm of the length is visible. Paleas about as long as the lemmas. Anthers 1.0–1.5 mm long, mostly deep violet. Chromosome no.  $2n = 14$ .

### FIELD RECOGNITION

On close approach, a *C. canescens* colony is seen to consist of small single tufted plants with no grouping or display of a sward. In early July plants can be seen 30 to 40 m distant when the panicles are spreading at anthesis and the colony is a mass of silver and pale pink colour. The stiff pointed leaf blades which form a dense cluster are a bright metallic green with the sheaths a pink-purple colour. In the autumn the tufts die back to a grey colour and the young green leaves grow from a bud

low on the culm which is hidden under the growing plant. A diagnostic feature is the shape and division of the awn.

#### HABITAT

Nomenclature for vascular plants follows Stace (1997) and for mosses, Smith (1978). *C. canescens* is found on tidal beaches, on fixed and mobile dunes and sometimes on coastal sandy turf: it is also known on isolated inland sandy heaths and dunes. It is essentially a plant of open conditions where wind can move and promote sand accretion around the plants. An internode low on the stem responds with vegetative elongation following partial covering by sand. It does not spread vegetatively and the new elongation only forms a replacement plant. Individual clumps of plants in the Breckland sites are rare outside the immediate area of a colony, as few plants are derived from seed. Its position on the coastal sands is often within 100 m of the tide and well within reach of salt spray and we may assume it has a fair salt tolerance.

Marshall (1967) reported that the habitats range from base poor soils to calcareous dunes within a pH range of 4.0–8.3 and also recorded that it is a plant of substrata which are extremely low in mineral nutrients. At Hedderwick, E. Lothian, v.c. 82, numerous samples were taken at ten stations at a depth of 6–105 cm on beach sand with a high proportion of shells. The pH ranged from 6.0–8.7, with one exceptional pH 9.08 and an outlier off the shells of pH 5.18. At Toigal, Westernness, v.c. 97, an equally high pH 8.3 was taken from a shell dune, which also demonstrated very low mineral nutrients with available phosphorus at 4 mg/l, potassium 9 mg/l and magnesium 7 mg/l. At Wangford, W. Suffolk, v.c. 26, the dunes are of coarse brown very acid sand, with a pH 4.6. The sand is mainly of quartz, stained with iron with a very small fraction of hematite black grains and no organic matter.

In various areas *Corynephorus canescens* is accompanied by a number of different taxa but the number of constant species per site is generally small. *Carex arenaria* is present at most sites and *Ammophila arenaria* is generally present at maritime sites.

#### CONSERVATION

The study site at Wangford Glebe is 2–5 km from Brandon in the W. Suffolk Breckland and is an S.S.S.I. owned by the Suffolk Wildlife Trust. *Corynephorus canescens* occupies a small fixed dune of 7 × 9 m which in 1995 was c. 80 per cent bare sand and invaded by *Carex arenaria* on all sides. *Agrostis vinealis* is its main constant species with a little *Polytrichum piliferum* occurring with *Cladonia* spp. It has recently been noticed that the annual disturbance caused by sand spreading is having the effect of reducing the *Cladonia*.

This site was found by M. G. Rutterford and myself in January 1970 (Trist 1971) and at that time it was thought to be extinct in Breckland. This find was then the only known inland site of *Corynephorus canescens* in Britain. Hind (1889) notes that Druce and Bolton King recorded *C. canescens* in July 1883 “between Lakenheath and Wangford”. Druce also collected specimens from the same site in August 1883 (OXF). This site clearly refers to the part of Lakenheath Warren now occupied as Lakenheath Airfield, where several large colonies of *C. canescens* survive.

Wright (1668) recorded severe sand storms in Breckland, which may have caused the large blow-out on Wangford Glebe. Sand storms still occur on arable land in Breckland and can do severe damage to recent seeding and pile up sizeable ridges of sand, but the storms are probably not so fierce as in the past. The taming of the wind has considerable significance in relation to the present conservation management of *C. canescens*. Some 70 years ago, the area from Lakenheath to Brandon was a vast open sandy heath with few trees and subject to frequent wind erosion. Large conifer plantings by the Forestry Commission in the 1920s have grown into mature trees and halted the distances over which erosion takes place, although it can still occur on the Wangford dunes which represent the last of the sites of active erosion in Breckland. This increasing wind protection has halted sand erosion around the Wangford colony of *C. canescens*. So active erosion is being effected by the Trust with annual rotovations in certain areas of the reserve. This colony is above a line of underground spring water which runs from a known site in the forest on the east of the reserve and follows its northern boundary to discharge eventually into the Wangford drain. This latter is over 3 m deep and in July 1992 was dry. The source of this water is probably

being diminished by a deep bore pump within 1.5 km of this site. As proof of its line, there were two very small colonies of *Juncus squarrosus* and a dozen or more plants of *Juncus effusus* which thrived in a water fed zone over an iron pan within the blow-out area and near the northern boundary of the reserve. An area some 250 m away in the centre of the reserve had up to 15 old tussocks of *Carex paniculata* and a bed of *Calamagrostis canescens*; these plants were no longer found after c. 1984. This loss of moisture is an additional factor in the conservation of the *Corynephorus canescens* site as it is encouraging the invasion of *Pteridium aquilinum*, *Deschampsia flexuosa* and *Carex arenaria*, all of which are increasing in the area of the *C. canescens*. The one-time open habitat requires management or it will be invaded to the exclusion of *C. canescens*. When the colony of *C. canescens* was first found in 1970, 231 plants were recorded. No detailed recording took place in the following years, but observations between 1972 and 1974 showed the population had apparently declined to about 150 plants. In the autumn of 1975 a count revealed that the population was reduced to 112 plants. It had been a dry summer and a few seedling plants were noted. A few of the dried up plants were showing young vegetative growth (Trist 1980). At this time, there was no sand movement by wind in the area of the *C. canescens* colony.

Marshall (1967) had noted that *C. canescens* is found in disturbed or open sandy places where up to 10 cm per year of accretion takes place: and while the adult plant cannot withstand complete burial, it responds to partial burial by vegetative elongation. Accordingly, in the autumn of 1975, artificial sand accretion was introduced by cutting a wide trench at the foot of the *Corynephorus canescens* sand bank to aid wind disturbance of sand. In addition, a good covering of sand was spread over the colony. This was repeated in the autumn of each year up to 1978. In Trist (1980) the report showed a count of 422 plants which I now consider inaccurate. The 232 yearling plants would be accurate but, "a further 190 flowering tufts, many of which were developing new vegetative shoots" should be disregarded. The total count should have been assessed at about 250 plants.

The management of the colony has both changed and lapsed. Between 1978 and 1992 no sand was applied to the plants and no counts were made until 6 February 1992 when 226 plants were recorded. The area was sanded on 7 March 1992. The next count was made on 17 June 1993 and showed 254 plants. Sand was again applied on 19 November 1993 and a count taken on 7 September 1994 revealed 265 plants. Later I did not feel satisfied that this was an accurate record, as at the time I recalled there were some plants in the process of dying back which were not showing the tuft of new leaves at the stem node. On 3 November 1994, a further count gave a total of 304 plants. The summer of 1995 was hot and dry and on 29 November 1995, a count of 142 plants also proved an inaccurate record, as there was an unusual number of seedling plants of *C. canescens* and other grasses which could not be separated at the young stage. Recording in September 1996 gave 303 mainly small plants with only one seed head.

Rabbits may play a small part in the conservation of *C. canescens*. They will eat young shoots of *Carex arenaria* but as long as other food is available, their attention to *C. canescens* is confined to biting off a few inflorescences which matters little as the loss of potential seed is probably of little account. At Wangford, propagation of the species is mainly by vegetative elongation. Since this colony was found in 1970, we have always had rabbits in residence. In 1995 there were two active burrows, the occupants of which contributed to sand disturbance.

The conservation of *C. canescens* is complicated. Some problems may be resolved while the solutions to others are impracticable and some not possible. The inland sites are subject to changes of their immediate surroundings by agriculture and other land uses. I agree with Marshall's (1967) conclusion that "many of the present day European communities of *Corynephorus canescens* owe their existence to human interference". This comment aptly applies to past and present events at Hedderwick, Lossiemouth, Kessingland and Lakenheath, which are recorded below. The coastal sites are at all times open to the threat of gales and tidal erosion.

#### SITE DESCRIPTIONS

##### THE COASTAL SITES

Suffolk has three coastal sites. These are considerably smaller in area and in population than those of Norfolk. At Minsmere Haven the area of 40 × 3 m is a restored site c. 230 m from the foot of

Minsmere cliffs. The former site on dunes near the base of the cliffs was destroyed in the sea floods of 1953. This new colony comprises 250 plants on the landward side of a sand bank between the boundary ditch of the R.S.P.B. reserve and the beach shingle ridge. The site is still within danger of a high tide. In 1992 the colony had no constant species.

At Kessingland our plant is sparsely spread out over beach sand and has to tolerate the summer activity of an adjacent holiday camp. *Catapodium marinum*, *Phleum arenarium* and *Vulpia bromoides* are scattered associates.

The site on the beach near Benacre Broad is spread over c. 0.16 ha. This colony flourishes in spite of considerable tidal approach as the land by the east coast inclines. In the past 30 years some gale force tides have crossed the beach to the land.

The Norfolk coastal sites are extensive, on tidal beaches and on hinterland dunes. Their total population of *C. canescens* would number many thousands. From Great Yarmouth dunes where this grass is abundant, north up the coast to Caister-on-Sea, the line of plants is almost continuous on the beaches for nearly 3 km. Just beyond the Caister lifeboat station, *C. canescens* colonises narrower dunes within the Caister golf course for a distance of c. 200 m. Our plants again occur to the south of Winterton-on-Sea where they also colonise hinterland dunes in comparative shelter where *Ammophila arenaria* and *Carex arenaria* are abundant. It is here that the dispersal of *C. canescens* is noticeable and which appears to indicate moisture competition with the above two species. From Winterton our plants continue north-east to Horsey Common and then abruptly stop. They reappear at Blakeney where there is a scattered population from west to east over to Blakeney Point, a distance of c. 800 m where our plant is frequent on grey dunes. There was a colony on the beach at The Hood, Blakeney which has a long and difficult approach over shingle. There are no recent records.

The constant species of the various sites north of Great Yarmouth up to Blakeney are fairly similar. *Jasione montana*, *Hypochaeris radicata* and *Rumex acetosella* are frequent and often with *Festuca arenaria*. Beyond the Caister lifeboat station the dunes are smaller and *Jasione montana* is replaced by *Campanula rotundifolia*. At Holme-next-the-Sea our plant occupies a small open dune on a slope surrounded by *Ammophila arenaria*. Some *Corynephorus canescens* is seen at the base of the slope within reach of high tides as indicated by *Glaux maritima* and *Silene uniflora*. The colony has a population of c. 300–400 plants.

All of the Norfolk sites are much exposed to wind erosion and several stretches of *Corynephorus canescens* between Great Yarmouth and Caister are occasionally subject to tidal wash. A large percentage of the colonies are remote and difficult of access.

The Ainsdale site on the S. Lancashire coast is on private ground on the boundary of the Ainsdale and Southport golf links and is a recent find of c. 1980. Its position partly within the golf course makes it locally safe. It is 1.5 km from high water on the coast and has a railway line and another golf links between it and the sea. Two former sites of *Corynephorus canescens*, at Formby, 6 km south of Ainsdale, have been lost by erosion, but at Ainsdale, accretion is now active and rabbits are contributing to the sand accretion requirements of *Corynephorus canescens*. Here the site is c. 100 × 4 m where our grass is dominant on two fixed dunes and has only *Hypochaeris radicata* and *Ornithopus perpusillus* as constant species. It is described by Savidge *et al.* (1963) as native. They record that there were formerly two sites between Formby and Freshfield in 1930, of which one became extinct in 1937 and the other was subsequently tidally eroded.

The site at Hedderwick near Dunbar is a recent discovery of 1986 by Anna Younger and is considered an introduction. The area is a raised beach of blown sand with a fairly high proportion of shells which is reflected in the soil analysis. The site has been subject to much disturbance in the recent past from sand extraction to use as a tank training ground. The plants were found in two dune bays which were surveyed in 1995 and found to have at least 275 clumps in the main bay of c. 5 m diameter and 35 clumps in the other bay of 1 m diameter. The site is enclosed by *Pteridium aquilinum* with some *Ammophila arenaria* colonising the east end. If the advances of these taxa can be held in check, the site is probably safeguarded. The constant species at Hedderwick are different as here we find *Arenaria serpyllifolia*, *Erodium cicutarium*, *Sedum acre* and *Thymus polytrichus*. One area is being colonised with a low mossy turf of *Brachythecium* sp., *Tortula* spp. and including a *Peltigera* sp.

At Lossiemouth, Morayshire is another introduced site, which is in a disused gravel pit, where 2000 plus plants occupy an area of c. 20 × 14 m. The plants are on a steep bank with *Pilosella*



*officinatum* and *Hypochaeris radicata*. Another colony by a caravan site has a similar number of plants but spread over a wider area; those on sandy heath have *Erica cinerea*, *Calluna vulgaris* and *Lotus corniculatus* as companion species.

The single plant of *Corynephorus canescens* found at Toigal by Morar, West Inverness-shire (Trist 1992) was on low dunes of highly mobile white sand on the shore of the tidal R. Morar. It was outnumbered by its constant species which included a single plant each of *Aira praecox*, *Rumex acetosella* subsp. *acetosella* and *Carex arenaria*. A few paces away was a small dune with a solitary plant of *Calluna vulgaris*. This was once a thriving colony which may have been introduced to this site. It was first found by F. Townsend in 1895 and now only a single plant bears witness.

The Jersey, Channel Islands, sites are all found in the south-west of the island on coastal dunes and where some of the colonies are extensive and would experience salt spray from high tide. The dunes at St Ouen are relatively flat compared with those of Les Quennevais which attain a little height where the sands are deep and are the largest systems on the island. These latter calcareous dunes of broken down shells are remarkably rich in species which include *Bupleurum fruticosum*, *Hornungia petraea*, *Rosa pimpinellifolia* and *Viola kitaibeliana* with large colonies of *Corynephorus canescens*. On the dunes at Les Quennevais and L'Ouaisné, *Lagurus ovatus* and *Poa bulbosa* are frequent.

#### THE INLAND SITES

One of the *Corynephorus canescens* sites in W. Suffolk is on Lakenheath Airfield where there are two stations. One is extensive and spread over an area of c. 0.4 ha which overlaps the parishes of Lakenheath and Wangford. The other, in the parish of Lakenheath, is c. 0.2 ha. The former has a population exceeding 5000 plants and the latter c. 500 plants. The site was formerly part of Lakenheath and Wangford Warrens which lie to the west of the A1065 road. It had been sheep grazed from early medieval times to 1942 when it was requisitioned by the Ministry of Defence. It was also an extensive rabbit warren for 700 years and there is some evidence of former cultivation (Crompton 1975). This western part of Lakenheath Warren was occupied by a series of dunes up to 1 km in width in the 1930s, with some dunes up to 6 m in height (Watt 1936). Following requisition, the dunes were destroyed and the entire area bulldozed flat and prepared for an airfield. The *C. canescens* recorded here is a relict of the find by Druce (1883, OXF) and the rediscovery by Crompton (1980). These airfield sites are mown twice monthly in the season and, in spite of this record of disturbance, a number of species survive. The large area contains *Agrostis vinealis*, *Crepis capillaris*, *Campanula rotundifolia*, *Galium verum* and *Silene otites*, while the smaller areas contribute *Coronopus squamatus*, *Festuca ovina* subsp. *hirtula* and a large colony of *Thymus serpyllum*.

The other site in W. Suffolk is also in the adjoining parish of Wangford. It lies 2 km north-east of the Airfield sites and 60 years ago would have been part of the huge dune system on the warren. This site is fully described under conservation at Wangford Glebe.

At Kinver Edge, which lies south-west of Kinver, Staffordshire, there are two sites of *C. canescens* which are c. 170 m apart and separated by an area of gorse, scrub oak and birch. The soil is a pebbly red sandstone with pH 6.7 which lies over Triassic Bunter Pebble Beds. The plants were found on a gentle slope of open semi-stable sand at 130 m. The constant species include seven mosses and three lichens with 24 higher plants which include *Calluna vulgaris*, *Deschampsia cespitosa*, *Erica cinerea*, *Luzula campestris* and *Teucrium scorodonia*. The site has been the property of the National Trust since 1917 and is c. 80 ha in extent. Although it is near to dwellings there is no encroaching urbanisation. The conservation of these two sites is related to passing walkers who are probably mainly responsible for sand compaction and so preventing accretion about the *C. canescens*. The population of c. 500 plants has remained fairly constant since 1977. The site is wardened and protective action is taken.

The Worcester sites consist of five colonies separated along the Severn Valley Railway, south of Devil's Spittleful where three of the sites are on the track side with two small colonies and a third site reported in 1991 to have an "abundant colony". Devil's Spittleful is under the care of the local District Council as a Nature Reserve. Two other sites are found on the embankment where, in 1989, a field meeting recorded "several plants", and a "large local area" reported in 1995. Another is located on Burlish Top which is c. 500 m south of the railway, where it was reported "locally

common" in 1989. The sites are within an extensive area of sand covering an area  $2 \times 2$  km and provide sandy tracks, heath and embankment habitats. The *C. canescens* plants spread along the rail track have originated from the adjacent sandy heath.

It seems clear that these several small locations of *C. canescens* represent a relict of a one-time large open area of sand which over time has become fragmented and buried under the neighbouring towns. *Silene conica*, which is now largely confined to East Anglia, has survived on Hartlebury Common since its discovery in 1900 and this site is within a few kms of the Devil's Spittleful *C. canescens* locations. *Teesdalia nudicaulis* is still frequent, but *Rosa pimpinellifolia* and *Erodium maritimum* found on these sites in recent years are now extinct. Our plant is carefully monitored by the vice-county recorder.

To give some interpretation of the present day inland and coastal habitats of *C. canescens*, we may consider the maritime sand habitats of the grass *Elytrigia repens* subsp. *arenosa*, which has a defined north-western European distribution which includes the east and south coasts of Britain (Trist 1995); it also occurs on heathland and sandy arable land in the Mainz area of Germany. On this extensive inland sand area many of the local taxa are also common to the sands of the W. Suffolk Breckland; both contain *C. canescens* and more than 20 other grasses (Hecker 1987). With the exception of those sites which are known or believed to be introductions, we may regard the W. Suffolk, Staffordshire and Worcestershire sites as relict areas which have resisted erosion.

#### THE DISTRIBUTION OF *C. CANESCENS* IN BRITAIN AND THE CHANNEL ISLANDS

*E. Suffolk*, v.c. 25. Dune at rear of beach, Minsmere Haven, TM/479.674, 18 July 1992, P. J. O. Trist; beach near Benacre Broad, TM/534.841, July 1995, P. Lawson and Y. Leonard; the shore, Kessingland Beach, TM/535.857, 7 June 1991, P. J. O. Trist.

*W. Suffolk*, v.c. 26. Fixed dunes, Wangford Glebe, Brandon, TL/757.843, 15 July 1994, P. J. O. Trist; heathland west of main entrance to Lakenheath Airfield, TL/745.809 and adjacent to runway, south of Wangford Farm buildings, TL/748.827–749.828, 18 July 1995, Y. Leonard and P. J. O. Trist.

*E. Norfolk*, v.c. 27. Coastal dunes, North Denes, Gt Yarmouth, TG/533.090 and uninterrupted on dunes north to the Lifeboat station, Caister-on-Sea, TG/528.118 and continuing north and through the Caister golf course to TG/527.122, 5 September 1995, A. Bull; mobile dunes, Winterton-on-Sea, TG/502.190, 10 September 1992, P. J. O. Trist; north to Warren Farm, north-east of Horsey Corner, TG/460.247, 5 September 1995, A. Bull; grey dunes, Blakeney Point, TG/000.465–008.465, 4 September 1994, A. Bull.

*W. Norfolk*, v.c. 28. Coastal dunes, Holme next the Sea, TF/705.445, 13 June 1995, G. Beckett and P. J. O. Trist.

*Worc.*, v.c. 37. Severn Valley Railway track adjacent to Devil's Spittleful, south-east of Wyre Forest, near Kidderminster: a. railway track side, Wribbenhall Junction, SO/798.749, 6 August 1991, R. Maskew and W. A. Thompson; b. railway trackside, SO/809.745–810.745, 6 August 1991, W. A. Thompson; c. railway embankment, SO/805.746, 30 July 1989, Worcs. Flora meeting; d. railway track side, SO/826.750, 29 June 1995, R. Maskew and W. A. Thompson; e. railway embankment, SO/832.752, 29 June 1995, R. Maskew and W. A. Thompson; sandy heath on Burlish Top, south-east of Droppingwells Farm, south-west of Kidderminster, SO/810.739–811.741, 30 July 1989, Worcs. Flora meeting.

*Staffs.*, v.c. 39. Sandy track side, Kinver Edge, south-west of Stourbridge, SO/834.827–834.825, October 1995, B. R. Fowler.

*S. Lancs.*, v.c. 59. On sand boundary with Ainsdale and Southport golf links, SD/318.127, 28 June 1994, V. Gordon.

*E. Lothian*, v.c. 82. Sandy turf by the estuary at Hedderwick Hill Plantation, John Muir Country Park, west of Dunbar, NT/642.789, 3 September 1995, H. Jackson and A. Silverside.

*Moray*, v.c. 95. Disused gravel pit, south of Lossiemouth, NJ/231.694, 24 July 1992, J. Edelsten and D. Law; caravan site on coast east of Lossiemouth, NJ/239.699, 24 July 1992, J. Edelsten and D. Law.

*Westernness*, v.c. 97. Mobile dunes, Toigal by the estuary of the R. Morar, near Arisaig, NM/674.922, 24 July 1991, A. Slack, E. Norman and P. J. O. Trist.

*Channel Isles*, v.c. 113. Jersey, coast dunes, Ouaisné, St Brelades Bay; coast dunes, La Pulente, St Ouen's Bay; coast dunes, La Carrière, St Ouen's Bay; higher interior dunes, Les Quennevais. All sites reported June 1995, J. Banks.

## GENERAL DISTRIBUTION

Britain to S. Baltic and to S. Portugal, N. Italy and across to Central Ukraine, local in the eastern part of its range.

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