

***Mentha cervina* (Lamiaceae), an emergent aquatic alien species naturalising at South Gare, North-East Yorkshire**

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This pdf constitutes the Version of Record published on 26th February 2020

Abstract

There is an increasing interest in recording early colonisation of organisms when studying changes in distribution ranges induced by climate change. Here, I describe one population of *Mentha cervina* L. (Hart's pennyroyal), naturalising in the wild at South Gare, v.c.62 North-east Yorkshire. Two other populations have been reported in Britain and none are known from Ireland. Of the three populations ever reported from the wild in Britain, two are still extant. It is unclear what vectors disperse *M. cervina* in Britain and whether the species is becoming increasingly naturalised or not. Diagnostic characters: digitate bracteoles and four calyx teeth, are provided to facilitate the recording of this mint species by field botanists.

Keywords: colonisation; climate change; dispersal; novel ecosystem; pond; macrophyte; non-native; mint

Introduction

Plant species distributions are expected to be greatly modified in the coming decades in response to various pressures from global change such as change in climate and land use. Monitoring the early introduction and colonisation of alien organisms is of great interest to understand species distribution dynamics associated with these changes (Roy *et al.*, 2012).

First introductions and first records in the wild of alien plant species are extensively documented in Britain and Ireland (e.g. Clement & Foster, 1995; Preston *et al.*, 2002) as well as Yorkshire (Wilmore, 2000). This article is a contribution to this body of work, focusing on *Mentha cervina* L. (Hart's pennyroyal), an alien species in Britain and Ireland potentially neglected by field botanists due to its absence in standard Floras in use (e.g. Stace, 2010). *M. cervina* is native to the Western Mediterranean (France, Spain and Portugal) and North Africa (Morales, 2010).

In this article, I describe a small population of *M. cervina* naturalised in a pond located at South Gare, Redcar, near Middlesbrough (v.c.62, North-east Yorkshire), and attempt to compile all known records of this species in the wild in Britain and Ireland. In order to conduct a search as comprehensive as possible, I have used the Internet, databases, Floras, and sought knowledge from local and national expert botanists.

South Gare population

Mentha cervina was first observed on June 16th 2019 in a pond during a BSBI meeting at South Gare, a coastal site of exceptional botanical diversity. Within the pond, it appeared to have been established for at least a year, judging by its mature, well established root system. There were six individual plants on the South-west rocky shore of the pond (Fig. 1A) all in a vegetative state and one plant was collected for cultivation and identification – Dave Barlow, Mike Wilcox and I were puzzled by this unknown plant.

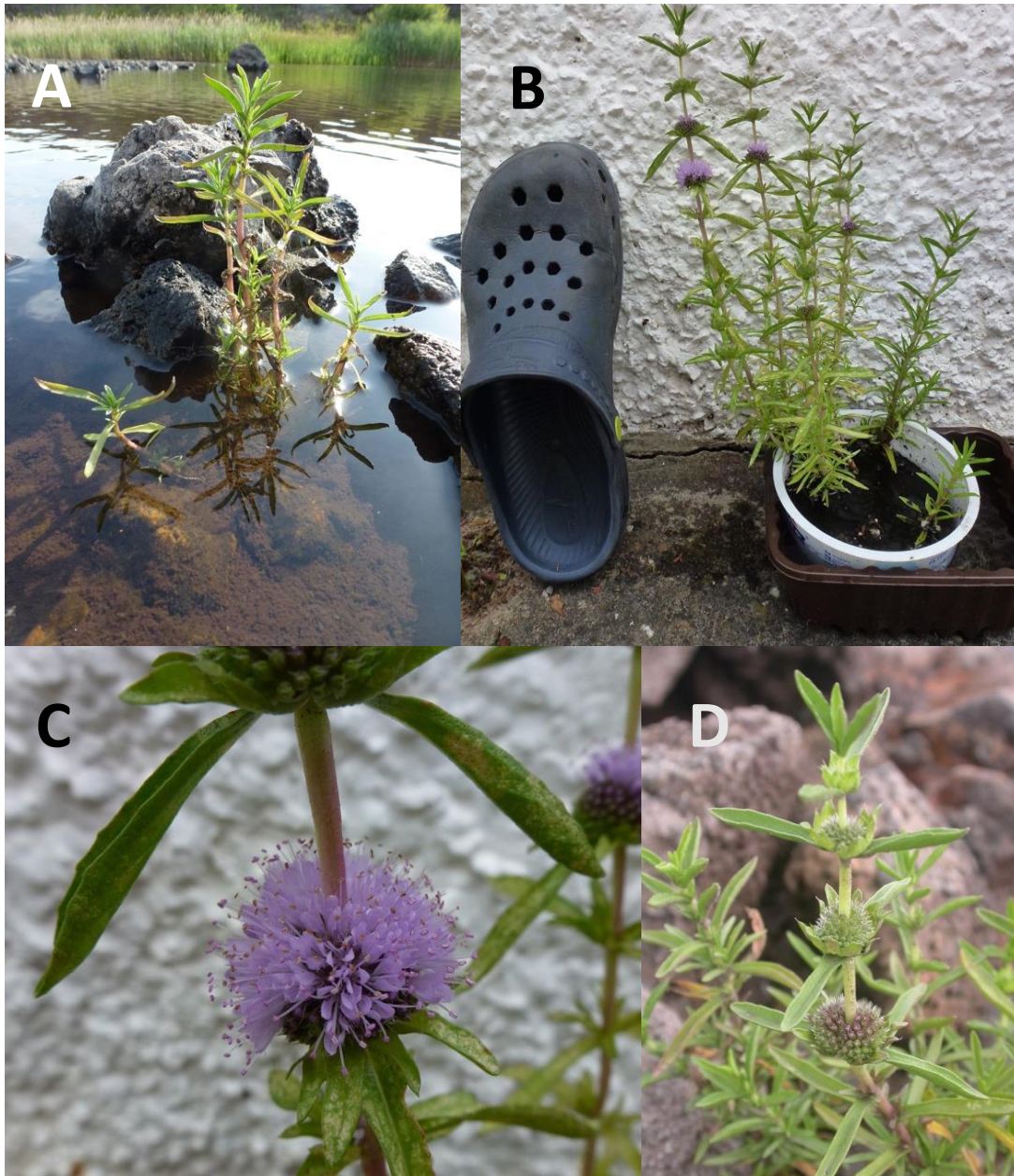


Figure 1. *Mentha cervina* in South Gare (A, D) and in cultivation (B, C). A: vegetative state; B: in bloom with a croc clog UK size 8 for scale; C: details of flowers; D: near flowering *in situ* on 03/08/2019. (Photo credits: A, B and C, the author, D, Mike Wilcox)

The plant was then monitored *in situ*, with regular site visits as well as *ex situ*, in cultivation in my garden. Flowering started early August both in the pond and in cultivation (Fig. 1B-D). During each visit to the site, the plants were in very shallow waters, a few centimetres deep, between slag boulders about 20 cm in diameter and of irregular shape. In the pond, the niche where *M. cervina* grows is devoid of other plants and probably without any competition. Other aquatic plants in the ponds were as follows. Submerged in deeper waters, on mud: *Zannichellia palustris*, *Potamogeton pusillus*, *Chara vulgaris* and *Chara contraria* var. *hispidula*. Emergents on the other shore: *Bolboschoenus maritimus*, *Typha latifolia* and *Phragmites australis*. Slag, the underlying substrate of the pond that makes up the rocky shoreline is a waste by-product from the steel-making industry that was dumped at the site in large quantities. The pond where *M. cervina* was found is probably a few decades old and maps from around World War II or before do not show the presence of any water body at this location.

It is unclear how the plant may have arrived. There are two likely possibilities, garden waste tipping or transport by birds from nearby garden ponds. South Gare has a long list of unusual alien species, many of which may have been introduced by (illegal) tipping of garden waste. The importance of fly tipping in introducing unusual alien species to the site was already well recognised in the 1990s (Cleveland Naturalist's Field Club, 1994). The towns of Redcar and Middlesbrough are located nearby and comprise many residential areas where garden ponds planted with garden-centre bought aquatics are frequent. As close as 2 km away from the site, there is an area of allotments where many people maintain 'wildlife' ponds planted with aquatics. A second likely explanation is that a bird could have transported a propagule, either seed or vegetative, from one of these 'urban ponds' into the site. Transportation of aquatic plants by birds is an increasingly recognised mode of dispersal (Green, 2016).

***Mentha cervina* in Britain**

Following the discovery of this small population, I undertook searches and found two other references to this species in the wild. In 2009, this species was reported to be 'spreading aggressively' in a single small pond at North Cave nature reserve, in South-east Yorkshire (Lockton, 2009). In 2015, it was reported from Chorlton near Nantwich, Cheshire (Kay, 2015). No other reference of *Mentha cervina* in the wild was found for Britain and Ireland. I followed up these two other records by contacting vice-county recorders and summarised the information in Table 1. Besides these three populations reported from the wild, *M. cervina* can be bought from online nurseries as a pond plant. It is not clear how large this trade is.

Identification of *Mentha cervina*

In a vegetative state, *M. cervina* does not visually look like a mint but the smell soon gives it away. The minty smell is similar to that of *Mentha aquatica* but even stronger. The plant observed at South Gare emerged about 20 cm above the water surface (10-50 cm tall according to the literature). The leaves are opposite, (near) glabrous, sessile, linear to linear-lanceolate, obtuse, entire or with poorly-defined, irregular teeth. Flora Iberica (Morales, 2010) provides more detailed information about the plant morphology and variability in its native range, including the presence of individuals with few to abundant short hairs on all parts. The inflorescences and

flowers are unique in two characters. First, the bracteoles are very distinct in their digitate shape; second, the calyx is divided into 4 teeth (other *Mentha* found in Britain and Ireland have 5-teethed calyx). The combination of digitate bracteoles and 4-teethed calyx distinguishes *M. cervina* from all other mints in the World (Tucker and Naczi, 2007). Best line drawings are those in Flora Iberica (Morales, 2010) and those of the digitised *Flore de Coste* (Tela Botanica, 2011).

It is currently unclear how many sites host this species across Britain and Ireland and whether it is in the process of naturalisation. I would be keen to hear of any additional sightings from the wild.

Table 1. Reported occurrences of *Mentha cervina* in Britain

Year observed	Reference	Site Name (and VC)	Grid reference	Population size	Introduction at site
2019	This article	South Gare (VC62 North-east Yorkshire)	NZ56972590	6 plants	Probably un-assisted
2014; 2019	Kay, 2015.	Chorlton, near Nantwich (VC58 Cheshire)	SJ72395098	unknown	unknown
2008-2011	Lockton, 2009.	North Cave (VC61 South-east Yorkshire)	SE88283335	Large and then slowly outcompeted by <i>Phragmites</i> until 2011 – not seen again since despite regular resurveys	Probably planted

Acknowledgments

Many thanks go to Graeme Kay and Stewart Robert Hinsley for information about the Cheshire population and to Richard Middleton for extensive information about the North Cave population. Thank you to Dave Barlow and Mike Wilcox, who discovered the plant with me and contributed to re-visiting the sites.

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ISSN: 2632-4970

<https://doi.org/10.33928/bib.2020.02.064>