

## Notes

### VIPER'S-GRASS *SCORZONERA HUMILIS* L. AT WAREHAM MEADOWS, DORSET

#### VIPER'S-GRASS IN BRITAIN

Viper's-grass *Scorzonera humilis* is restricted to four sites in Britain, in two Dorset and two in South Wales, and is classified as Vulnerable in the Vascular Plant Red List for Great Britain (Cheffings & Farrell 2005). Historically, another three populations were known from England, one in Warwickshire, and two in Dorset.

In Warwickshire, five plants were found in 'a damp, old meadow on a sandy clay soil' in the 1950s (Hawkes & Phipps 1954). The meadow was an unimproved, but not particularly species-rich, grassland, a habitat that 'is not apparently specialised and must be mirrored in thousands of places in the British Isles.' This small population persisted for less than fifteen years after its discovery and it was extinct by 1965 (Perring & Farrell 1983).

The two extinct Dorset sites were on a roadside 1 km to the east of Wareham Meadows, and in a wet, grassy field over 11 km away (Hall 1928). The roadside site contained 'a single fine plant' according to John Raven in 1972 (record card in Biological Records Centre, Monks Wood), but this plant has since died.

Viper's-grass is still present at Corfe Common in Dorset, where there were four flowers in 2006 (B. Edwards pers. comm.)

Two Welsh sites were discovered in 1996 and 1997 (Preston *et al.* 2002), and at least one of them contains many thousands of plants in 'several hectares of marshy pasture' (Woodman & Walls 1999).

The remaining English site is at the Royal Society for the Protection of Birds' Wareham Meadows nature reserve. The earliest record certainly from this locality is from 1950, but it is assumed that this is the same location where the plant was first discovered in Britain in 1914 (Druce 1915). The '*Scorzonera* field' is a 1 ha plot surrounded by ditches on three sides, with a rushy pasture to the west into which the Viper's-grass is spreading into. It has been found in some of the adjacent fields in the past (Druce 1916).

#### CONDITION OF THE WAREHAM MEADOWS SITE

If this field is the same one that Noel Sandwith found over 90 years ago, it appears to have become more overgrown and enriched. On his visit in 1916, G. C. Druce found Viper's-grass 'in great plenty growing in a very wet pasture among *Hydrocotyle*, *Ranunculus flammula*, *Carex panicea*, *Carex echinata*, *Carex flava* var. *oedocarpa*, *Carex* [nigra], *Molinia*, *Cirsium* [dissectum], *Potentilla palustris*, *Juncus articulatus*, *Juncus acutiflorus*, *Festuca rubra*, *Agrostis* [stolonifera], and [*Danthonia decumbens*]'. In his note from 1929 he adds Bulbous Foxtail *Alopecurus bulbosus* (Druce 1929). Purple Moor-grass *Molinia caerulea* is still frequent, but Soft Rush *Juncus effusus* is spreading, there are two stands of Common Reed *Phragmites australis*, and the northern part is dominated by a stand of Greater Pond-sedge *Carex riparia*. The reed and pond-sedge both spread after changes were made to the water levels on the rest of Wareham Meadows in 1997–1998. Viper's-grass is now most frequent in the drier, western half of the field, in the more open grassland.

In the late 1990s, although there were still thousands of plants in the field, RSPB staff were concerned that the vegetation was becoming too rank for the Viper's-grass; this concern was also expressed by the authors of the account in the *Red Data Book* (Woodman & Walls 1999). A small part of the south-western corner of the field, covering approximately 15 m × 20 m, was cut with a hay mower in mid-August 1999, to see if this would benefit the Viper's-grass by reducing the growth of the surrounding vegetation. The following year, a larger area, covering most of the western half of the field, was hay cut, and the reed and sedge beds were flailed. Prior to these cuts, the field had been fenced off (by the previous tenant) to protect the plants, and it had not been managed for at least five years. In subsequent years, encroaching reed and sedge were cut and removed, and in August 2006, after the Viper's-grass had finished flowering, cattle were brought in to the field to graze it.

These measures do seem to have created a more open structure, but more information was needed about how the plants were responding.

#### POPULATION STRUCTURE AT WAREHAM MEADOWS

In Belgium, many Viper's-grass populations contain a large number of old plants with very few young ones, and seedling establishment is rare (Colling *et al.* 2002). This age structure is particularly prevalent in drier sites with taller vegetation and more nutrients. These aged populations may be in danger of extinction if they are unable to replace dying plants with new seedlings. In contrast, there are other populations, in wetter and more nutrient-poor sites, with a much higher proportion of young plants. These regenerating populations may be more viable than the older ones.

In July 2002 attempts were made to assess the condition of the population using similar methods to the Belgian study: the number of plants in each of four size classes was recorded in ten randomly sited 1 m × 1 m quadrats. Size is probably closely correlated with age in Viper's-grass, and it was measured by the number of basal leaf rosettes on each plant (the four classes were: one rosette; 2–5 rosettes; 6–25 rosettes; and more than 25 rosettes). The results suggested that the structure of the Wareham Meadows population was somewhere between that of the regenerating and aged populations found in Belgium, but this was a small sample with only 33 plants in the quadrats and very few young seedlings. This indicated that the conditions in the field could be improved by creating a more open structure to the sward. In August 2002, the bridge across the ditch into the *Scorzonera* field was repaired and cattle were allowed in to graze the site and open up the vegetation.

In April 2003 a larger sample was taken using 50 randomly sited quadrats to assess the age structure and map the distribution of the plants.

The results (from 195 plants) were very similar to those from 2002 (Fig. 1), with 86% of the plants in the 2–5 and 6–25 rosettes classes. There were few presumed young plants (those with a single rosette), but there were even fewer very old ones (those with more than 25 rosettes) (Table 1).

In 2005, the reed and sedge beds were cut again, and cattle grazed the field in 2006. In April 2007 the 2003 survey was repeated using another 50 random quadrats. This time the results (from 178 plants) showed 87% of plants were in the 2–5 and 6–25 rosette classes with more (56% of all plants) in the 2–5 class (Table 1). This could suggest that there were more younger plants in 2007, in response to the habitat management work. Difficulties in distinguishing individual plants may have led to overestimates of the number of smaller plants. For example, one plant had three single rosettes at least 10 cm apart from each other, but they were all connected by one rhizome.

#### VIPER'S-GRASS DISTRIBUTION AND THE VEGETATION AT WAREHAM MEADOWS

The map (Fig. 2) shows the number of Viper's-grass plants found in each quadrat, the position of each quadrat, and the vegetation in the field in April 2007. In both 2003 and 2007, most of the plants were amongst the more open Red Fescue *Festuca rubra* and Purple Moor-grass *Molinia caerulea* on the western side of the field. There were also many plants in the stand of other grasses in the south-west corner of the field, but this was largely excluded from the quadrat survey, which used a north-south and east-west grid and so cut off the north-west and south-west corners of the field. This open grassland was the favoured habitat: there were a few plants in the more tussocky grassland, in the open rush beds, and in the edge of the sedge bed along the northern side, but there were none in the middle of the dense rush,

TABLE 1. THE NUMBER OF VIPER'S-GRASS *SCORZONERA HUMILIS* PLANTS IN DIFFERENT SIZE CLASSES IN SAMPLES FROM 2002, 2003, AND 2007

Year	Number of rosettes per plant					N plants	N quadrats
	1	2–5	6–25	25+			
2002	4	12	16	1		33	10
	12%	36%	48%	3%			
2003	17	22	96	10		195	50
	9%	37%	49%	5%			
2007	19	100	56	3		178	50
	11%	56%	31%	2%			

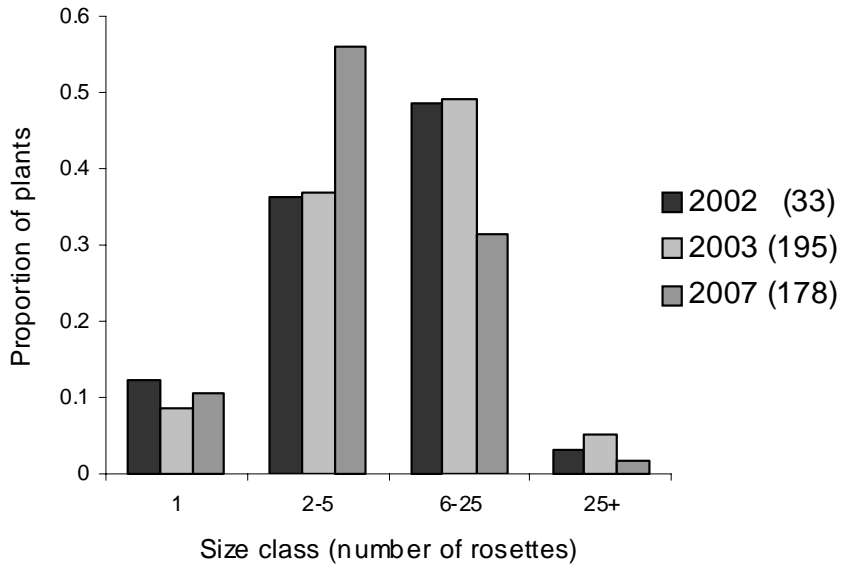


FIGURE 1. The proportion of Viper's-grass *Scorzonera humilis* plants in each of the four size classes in 2002 and 2003. Sample sizes were 33 plants in 2002 and 195 plants in 2003. The number of plants surveyed in each year is shown in brackets.

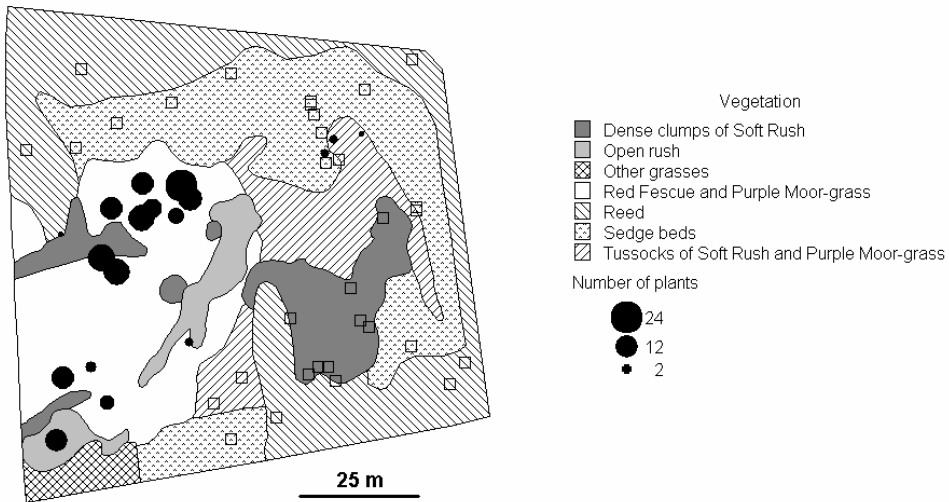


FIGURE 2. Vegetation and the number of Viper's-grass *Scorzonera humilis* plants in fifty 1 m × 1 m quadrats in the field at Wareham Meadows in April 2007. Squares show the position of quadrats where no plants were found.

reed, or sedge beds. A survey in 1997 produced similar results (Clowes 1998). In 2007, when the vegetation was mapped using GPS equipment, the favoured habitat covered just under a quarter (0.21 ha, 24%) of the field, the unsuitable area of rushes, reeds, and sedge beds covered two-thirds (65%, 0.57 ha), and the remaining 10% (0.09 ha) was tussocky Purple Moor-grass and rushes.

Extrapolating the mean number of plants per quadrat (12.3) in the Red Fescue and Purple Moor-grass area over the whole area covered by this favoured habitat, gives a population estimate of about 23,000 plants (bootstrap analysis places confidence limits of 15,000–29,000 on this estimate).

#### HABITAT MANAGEMENT FOR VIPER'S-GRASS

After a gap of many years, the *Scorzonera* field is being grazed again. It is expected that cattle grazing will open up the tussocky grassland, create more suitable areas for seedlings to

establish, and improve conditions for the Viper's-grass. Open conditions in the adjacent western field are maintained by cutting or grazing, which should aid the spread of the plant and increase its distribution. Viper's-grass has already spread at least 27 m into this field. The population will be monitored to make sure that grazing is having the desired effect.

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