

Semi-natural, western hill vegetation under defined management systems, 1995 to 2008

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Introduction The status of upland habitats, especially western blanket bog and wet heath, is a matter of official concern (NPWS, 2008). The Teagasc Hill Sheep Farm, which ranges in altitude from 15 to 275 m O.D., is c. 20 km inland from the mid-western sea-board and contains c. 250 ha of unimproved hill vegetation that mainly represents a complex of blanket bog and wet heath habitats. The objective was to assess the influence of physical factors on the semi-natural vegetation under defined management systems over time.

Material and methods The unimproved area was grazed at 0.9 ewes/ha from 1995 to 1998 and 0.8 ewes/ha from 1999 to 2008 with a relatively consistent monthly variation throughout. A grid, 100 m x 100 m, was surveyed giving 226 intersection points which formed the basis for quantifying the physical attributes, physiography (6 categories), soil (4 categories) and altitude (3 categories), of the hill and vegetation. The latter was estimated by a modified point quadrat system giving 100 observations at ground level each time. Animal holding areas, which accounted for six to eight intersection points, were excluded. Vegetation height, 1999 to 2008, was calculated using the same quadrat to give 20 hits at each intersection point. The associations between physiography, soil and altitude and the frequency of the overall vegetation, its individual groups and vegetation height were evaluated by PROC GLM (SAS, 2002-3).

Results The mean frequency (%) of the vegetation occurrence, which consisted of grasses, sedges, bryophytes, heathers and 'other forbs', increased from 64.5 in 1995 to 82.8 in 2008. Grasses and sedges together accounted for 73% of the vegetation in 1995 and 66% in 2008. Physiography was significantly associated with the distribution of the overall vegetation frequency ($P < 0.001$) and with that of sedges ($P < 0.001$), bryophytes ($P < 0.05$) and heathers ($P < 0.05$), in 1995 while it was significantly associated only with 'other forbs' ($P < 0.05$) in 2008. Soil was significantly associated also with the overall vegetation frequency ($P < 0.05$) and with that of grasses ($P < 0.01$), sedges ($P < 0.001$) and 'other forbs' ($P < 0.05$) in 1995 and maintained that association but with the replacement of 'other forbs' by heathers ($P < 0.05$) in 2008. Altitude, which was limited in amplitude, was strongly associated only with the frequency of 'other forbs' ($P = 0.06$) in 1995 but had no significant association with the distribution of the total vegetation or its groups in either 1995 or 2008. The changes in vegetation frequency at all category levels from 1995 to 2008 were mostly positive. Physiography was significantly associated with the change in sedges ($P < 0.05$), soil with that in heathers ($P < 0.01$) and 'other forbs' ($P < 0.05$), while altitude was not significantly associated with any of the changes. Overall mean vegetation height remained relatively unchanged at c. 21 cm but the changes at category level were both negative and positive. Physiography was significantly associated ($P < 0.05$) with vegetation height in 1999 and very significantly ($P < 0.001$) in 2008 when both soil and altitude were also significantly associated ($P < 0.05$) with vegetation height. All factors, physiography ($P < 0.01$), soil ($P < 0.001$) and altitude ($P < 0.01$), were significantly associated with the change in vegetation height from 1999 to 2008. Some examples of the associations are contained in Table 1.

Table 1 Least square means (s.e.) for frequency of sedges and vegetation height by soil category

Soil (<i>n</i>)	Frequency of sedges (%)		Vegetation height (cm)	
	1995	2008	1999	2008
Lithosol (72)	17.8 (1.9)	22.5 (2.1)	20.0 (1.5)	15.4 (1.6)
Gley/Podzol (22)	20.1 (2.4)	26.4 (2.7)	17.1 (1.9)	19.7 (2.0)
Peat <50 cm (27)	22.4 (2.2)	27.9 (2.5)	18.9 (1.8)	19.4 (1.9)
Peat ≥50 cm (89)	28.0 (1.6)	34.1 (1.8)	18.7 (1.3)	18.1 (1.3)

Conclusion The changes in the frequency of vegetation from 1995 to 2008 generally over-shadowed the initial association with the physical factors, except soil. The latter persisted with a significant association not only with the overall vegetation but also with grasses, sedges and heathers. Soil is thus an important factor in monitoring the effect of land use in this environment. The substantial increase in the general vegetation cover and decrease in the dominance of the two main groups, grasses and sedges, suggest that the management system on the hill is increasing biodiversity and is sustainable.

Acknowledgements The authors gratefully acknowledge the input and support of Dr. J.P. Hanrahan and funding from the N.D.P.

References

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