

Chapter (non-refereed)

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Soil fertility and nature conservation: research note

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The loss of species diversity in many infertile semi-natural communities, such as grasslands, heaths and moors, is often ascribed to the effects of increased fertility, sometimes described as soil eutrophication. If these infertile habitats are to be conserved, the solutions are obvious: (i) prevent fertilizer additions, and (ii) manage the site to remove more nutrients in the crop than are added by natural inputs. However, on sites which have already suffered from fertilizer additions during agricultural improvement, there is an increasing desire by conservation bodies to restore semi-natural plant communities. This demand should increase if future economic policies dictate land use changes from intensive agricultural production to less productive uses, and will be especially marked in areas of marginal land, where production is limited by climatic or soil factors.

There is an enormous range of potential methods which could be used to reduce soil fertility, including grazing, burning, cropping, topsoil stripping, topsoil burial and introducing species which degrade the surface soil. Only limited quantitative information is available for a few of these methods, and few attempts have been made to use any of these techniques on a large scale for the specific objective of reducing soil fertility. This note reports some results of one such attempt at Roper's Heath in Suffolk. An agricultural field separated 2 heathland nature reserves, and the aim of the Nature Conservancy Council was to restore heathland vegetation. Two methods for reducing soil fertility were investigated:

- i. cereal cropping. Here, cereal rye was grown without fertilizer additions. The effectiveness of the treatment was assessed by measuring the nutrients taken off in the crop and by measuring soil fertility in cropped and uncropped areas using a combination of chemical analyses and bioassays. The cereal crop removed more P and K, but not N in grain, compared to the inputs, but, if the straw was also removed, there was also a net loss of N. The bioassay results suggested that the fertility of the soil was reduced by treatment.
- ii. topsoil stripping. Results of similar studies on the fertility of the different depths of soil on the site suggested that, if the surface 20 cm of soil was removed, then there would be a significant and immediate reduction in fertility.

The studies at Roper's Heath have, unfortunately, come to an end, but are reported in detail by Marrs (1986). The work has highlighted many areas of ignorance; in particular, we do not know how infertile soils need to be in order to support specific plant communities. Further research on this topic is planned on a wider range of sites.

Reference

Marrs, R.H. 1986. Techniques for reducing soil fertility for nature conservation purposes: a review in relation to research at Roper's Heath, Suffolk. *Biol. Conserv.*, **34**, 307-332.