

A SCIENTIFIC APPROACH TO A POLICY ON COMMERCIAL COLLECTING OF WILD FUNGI

The need for the British Mycological Society to develop a policy on commercial collecting of fungi was outlined in *Mycologist* 11, pp 27-28. This paper aims to provide an overview of the scientific arguments and research results on the viability of large-scale harvesting and assess the implications for wildlife conservation policy. The primary concern is the long-term survival of collected species and the consequential effect on habitats and dependent organisms.

The science and research results

Harvesting fungi only involves collecting the fruiting body, leaving the mycelium in the soil. For some mycorrhizal species the mycelia are known to survive for very long periods, perhaps centuries. The majority of commercially collected species are mycorrhizal and many are still relatively abundant: *Boletus edulis*, *Cantharellus cibarius* and *Lactarius deliciosus* are all widely distributed in Europe. This would appear to be a good model of a sustainable yield system; however, Arnolds (1991) reports strong evidence for declining yields from a number of such species across Europe.

Well designed field experiments have been undertaken by Simon Egli and Francois Ayer (Egli, 1995) for the Swiss Institute of Forestry, and by Notvell (1996) for the Oregon Mycological Society. The aim of both studies, conducted over ten years, was to determine the effects of intensive harvesting on the yield of macromycetes. The results show clearly that harvesting itself has no significant effect. However, Egli showed that trampling did significantly reduce yields, possibly through soil compaction. This finding could have important implications.

Many factors other than large-scale collecting affect the viability of fungi: habitat loss, changing farming and forestry practices and pollution are the main concerns. Research on habitat loss is now extensive throughout Western Europe. Many commercially collected species of fungi occur in rapidly declining habitats, and semi-natural and forested areas cover a far lower proportion of the land surface in Britain and Eire than in most other European countries. The use of exotic tree species in afforestation schemes, large single-species plantations and clear felling practices have all affected fungi. Rotheroe *et al* (1996) refer to the fact that agricultural change has also been very significant.

Gulden *et al* (1992) have shown that pollution leading to soil acidification inhibits the produc-

tion of fruiting bodies. Recent experimental work in Scandinavian forests reported by Brandrud (1995) shows dramatic reductions of fungal fruiting bodies as a result of nitrogen enrichment.

The picture which emerges from current research in continental Europe is one of falling yields due to habitat loss, farming and forestry changes, pollution, and recreational pressure. Increasing pressure from collecting is focused on this diminishing resource.

The conservation issue directly concerns the long-term viability of species, not falling yields. The factors which govern the establishment of new mycelia and the colonisation of new sites in the wild are very complex. It is a striking feature of most fungi that they produce millions of spores. *Agaricus campestris*, for example, may liberate 500,000 spores per minute over several days. The wastage rate is clearly enormous and the chances of establishing new mycelia are likely to be very low, even where there are huge numbers of spores available. Reductions in spore numbers, from whatever cause, will reduce the chances of reproductive success.

Rare species of fungi may be particularly vulnerable to removal of fruiting bodies. Those that occur late in the forest cycle associated with old trees of fragmented habitats such as heathlands are most likely to be in this category. Although few of these, other than *Hydnum* spp, are commercially collected there is some evidence that unskilled commercial pickers collect indiscriminately; for example those collecting *Boletus edulis* may collect all boletes. These are then sorted and graded at the purchaser's premises where the inedible, possibly rare, species are then discarded. This practice may directly impair the establishment of mycelia at new sites. We have found no valid research on this topic.

Removal of fruit bodies also affects those organisms that live on fungi, particularly those wholly dependent on particular species as a source of food. Alexander *et al* (1996) cite certain fungi as an essential breeding medium for a large range of invertebrates, including many rare and threatened species.

Discussion

It is the combined effects of all these pressures on populations of wild fungi that is the real cause for concern. Research on this topic is urgently needed, but will be very difficult to design. Work on fungal succession is beginning to clarify the

establishment of early-stage fungi. However, late-stage fungi which include many of the rare and collected species, are less well understood. In the Netherlands the forests established on the new polders are being intensively monitored. This very long term recording work to determine fungal succession may eventually (in say another 50 to 400 years) give some indication of the differences in establishment rates of collected and other fungal species.

With a £1 billion per year world market for chanterelles, Leigel (1995) estimates that their harvest value taken over a century is likely to exceed that for timber at a given site. Such economic potential does much to raise the profile of fungi with landowners. Rowe (1997) reports that the extreme pressures from commercial collecting in Oregon are already leading the US Department of Agriculture to spearhead a series of long-term research projects on fungal sustainability. Until the results are available they are taking the precautionary approach of licensing pickers. Such strategies need to be considered in Britain.

Relief in future may come from advances in research which improve the prospects for large scale commercial growing of fungi. For example, the expansion of commercial growing of *Agaricus bisporus* may reduce the collection for sale of *Agaricus campestris*. Isolated advances have already been made in cultivation of *Morchella esculenta* by Ower et al (1988). Danell & Camacho (1997) have just reported research advances for the chanterelle, although these are unlikely to be translated to commercial production until the mycorrhizal dependency on the tree is broken.

For the less fashionable species the position is very different. The market will not justify research and the pointers are all negative, scientific results scarce, and monitoring is poor. There must therefore be serious doubts as to the sustainability of the current level of commercial collecting.

The Convention on Biological Diversity signed at the Rio summit has given new impetus to wildlife conservation and the protection of species. Amongst the principles set out at Rio in Agenda 21 was the 'precautionary principle'. It suggests that in order to protect the environment the precautionary principle should be widely applied by member states and that lack of full scientific certainty should not be used as a reason for postponing cost-effective measures to prevent environmental degradation. National and European legislation is gradually being strengthened as a result. It is still strongest in its protection of birds and mammals and weakest in the protection of fungi. Lack of informa-

tion continues to delay the drawing up of schedules to protect endangered species of fungi and their habitats.

The collecting debate

Increased commercial collecting has led to heated debate on the rights of local people and landowners and on the aesthetic consequences. In Britain there are long established de facto rights to collect wild fruits, and common rights giving access to such sites as Ashdown Forest, the New Forest and the Forest of Dean. The law is silent on the extension of these common rights into the commercial collection of fungi. In Europe where communally owned forests are frequent, it is relatively easy to enforce bylaws that allow local people to collect and restrict commercial collecting. Anecdotal evidence suggests that these local rights have in the past been exercised responsibly.

The position of the private landowner in England and Wales is clear. The commercial picking of fungi on private land is an offence under section 4(3) of the Theft Act 1968. Those purchasing these fungi are also guilty of an offence. In Scotland the law requires owners to prove trespass and demonstrate the fungi were being pilfered with a view to being offered for sale. The aesthetic arguments are clear; sites stripped of their fungi rob others of enjoyment.

Implications for BMS conservation policy

Rare and endangered species are now to be protected as well as identified. Habitats also need protection; those which already are afforded protection of other wildlife need it extended to their fungal populations. The most practical and cost effective way to implement the precautionary principle would be to restrict collection of fungi on vulnerable sites to scientific sampling. The growing body of conservation legislation needs to be drafted so that it can be applied to the fungi, and implemented to give them protection. The BMS should add its voice to those calling for stricter control of pollution. Finally, commercial collecting of fungi should be supported only where it is sustainable.

A firmer conservation policy is now needed to improve habitat and species protection, apply the precautionary principle and ensure the long term viability of the fungi.

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CORRESPONDENCE

The Encyclopedia of Fungi

I note the critical letter from Alick Henrici (November 1996 issue) which refers to the findings of an unnamed dozen field mycologists of wide experience who claim many clearly visible misidentifications in relation to the *Encyclopedia of Fungi of Britain and Europe*.

It may help place the matter in perspective to cite the documented findings of Dr Thomas Kuyper, who has kindly made a systematic study of sections of the book. He reports that the level of accuracy he finds in the *Encyclopedia* is comparable to that in relevant volumes of Breitenbach and Kränzlin (*Fungi of Switzerland*) and Cetto (*I Funghi dal Vero*). Mr Henrici is on record as holding the *Fungi of Switzerland* in high regard.

I am also at a loss to comprehend the thrust of remarks regarding species not previously recorded in Britain since the title is the *Encyclopedia of Fungi of Britain and Europe*.

Michael Jordan

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Editor's note: Mr Jordan does not indicate whether the species 'not previously recorded from Britain' were in fact photographed elsewhere, and if not so, whether there is herbarium material to substantiate any new British records.

Flammulina velutipes

In my local meanderings during the past two or three winters, I have been struck by the almost total absence of *Flammulina velutipes* from its usual widespread sites. In this area, mid & lower Deeside, the most favoured host is Broom (*Sarothamnus scoparius*).

This winter the fungus has been fairly abundant. As this colourful species is the only one readily available in the winter with which to stimulate the interest of others in the world of fungi, it serves the amateur well.

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