Silvicultural challenges in Great Britain

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Britainia Handiko basogintzak buru egin beharreko erronka zientifiko eta tekniko asko berdintsu gertatzen ahal dira beste herrialde epel batzuetan, eta are tropikaletan ere. Maila desberdinean bada ere, ia mundu osoan politikoek eta zuhaitzen landaketaz arduratzen diren pertsonek tratatu beharreko arazoak dira horiek, zalantzarik gabe. Biztanleriak ingurugiroaz harturiko kontzientziazio handiagoa da egungo erronka gehienen sorburua: gai kimikoen erabilera baztertzea, baso naturalagoak egitea tokiko zuhaitz motak sartuz, etab. Txosten honetan arazo horiek guztiak ukitzen dira, halakoen konponbidean lorturiko aurrerapenekin batera.

Gilt-Hitzak: Basogintza Britainia Handian. Basogintzari dagozkion arazoak.

Muchos de los desafíos científicos y técnicos a los que se enfrenta la silvicultura en Gran Bretaña puede aplicarse de igual manera en otros países templados, e incluso en los tropicales. En distinto grado, se trata con seguridad de cuestiones a tratar en casi todo el mundo por políticos y por personas que se ocupan del cultivo de árboles. La mayoría de los desafíos actuales tienen su origen en la mayor concienciación medioambiental de la población: la evitación del uso de sustancias químicas, bosques más naturales con especies autóctonas, etc. En este informe se tratan estas cuestiones y se debaten los progresos alcanzados en su resolución.

Palabras Clave: Silvicultura en Gran Bretaña. Cuestiones relativas a la silvicultura.

Beaucoup de défis scientifiques et techniques auxquels doit faire face la sylviculture en Grande Bretagne peuvent être appliqués également dans d'autres pays tempérés, et même dans les pays tropicaux. A un autre niveau différent, on expose les sujets traités dans pratiquement le monde entier par des politiciens et par des personnes qui s'occupent de la culture des arbres. La plupart des défis actuels ont pour origine une plus grande prise de conscience de l'environnement par la population: la non utilisation de substances chimiques, des forêts plus naturelles avec des espèces autochtones, etc. Dans ce rapport on traite de ces questions et l'on examine les progrès effectués dans le but de les résoudre.

Mots Clés: Sylviculture en Grande Bretagne. Questions relatives à la sylviculture.

INTRODUCTION

Although this paper focuses on the silvicultural challenges facing forestry in Great Britain, many of them apply equally to other temperate countries, and even to tropical ones as well. To varying degrees, they are certainly the subjects of debate almost everywhere by policy makers and those concerned with growing trees. This paper deals with silvicultural matters, and Pryor (this volume) concentrates on related social and environmental issues.

Most current challenges arise from the increased environmental awareness of the population, and a desire for sustainability. They include a desire to avoid the use of chemicals—herbicides, insecticides and even fertilisers—in forests. They also include a wish for forests to be more 'natural', using native species rather than exotics, and encouraging natural processes of regeneration (such as 'continuous cover' forestry) rather than undertaking large scale clear-cutting and replanting, as has been the case in the past. Wildlife in forests is increasingly appreciated, even animals such as deer and grey squirrels which, in large numbers, are highly damaging to trees.

There is considerable, frequently uninformed, debate on these issues, but scientific knowledge is often lacking. Among the silvicultural matters that are most pressing in Britain, where returns from forestry are not very high, are:

- Methods of promoting natural regeneration with many species are poorly understood and undeveloped, possibly because good seed years are relatively rare. The desirable sizes of felling coupes and the extent to which continuous cover forestry can be practised in the generally windy climate of Britain require more investigation.
- The issue of developing measures of sustainability to plantations.
- In a country where weed growth is prolific, at least in the lowlands, how can young trees become satisfactorily established, at an acceptable cost, without the use of herbicides?
- As second rotations of coniferous trees become more common, how can the increasingly serious pest, the pine weevil (*Hylobius abietis*), be controlled without the use of insecticides?
- Numbers of deer of several species have increased enormously since the 1970s to the serious detriment of regeneration—both planted and natural—yet policies and practices for controlling them are not well developed. Even methods for assessing numbers accurately are not known.

These points are elaborated upon in the rest of the paper, and progress with their resolution discussed.

NATURAL REGENERATION

Methods of promoting natural regeneration at least with our main broadleaved trees, oak and beech, are poorly understood and undeveloped, possibly because good seed years are relatively rare. The desirable sizes of felling coupes (those that simulate what might happen in natural conditions), and the extent to which continuous cover forestry can be practised in the windy climate of Britain require more investigation.

Until recently British forests have been predominantly even-aged monocultures managed on a clear felling system. With the strong emphasis today on recreation, conservation and

landscape (*e.g.* Hibberd 1985, Forestry Commission 1990, 1992a, 1992b 1993, 1994, 1995a, 1995b), there is much more interest than before in diversification in terms of species mixtures and the use of silvicultural systems other than clear felling. There is a clear need for research into this area, and to design systems with reference to wind damage (Ford 1980, Quine *et al.* 1995). However, because none of the major species planted is a shade bearer, and because of the relative ease and economy of applying the clear felling system, it is unlikely that any other will be used on a wide scale. Although there is much interest in planting species mixtures, they often prove unsuccessful due to incompatible growth rates and/or neglect. Natural regeneration is becoming more common in the lowlands and uplands, but research is needed to make it reliable enough to use widely.

Upland forests are now being restructured both for biodiversity and to eliminate eyesores, as first rotations come to an end. The areas planted are much smaller than formerly, and adjoin stands of different ages and sometimes species. By these means a large measure of diversity can be achieved that will satisfy many of the non-production objectives, if the planting is done sensitively. In addition, up to 15% of forests are now planted with native species or left unplanted to aid habitat and landscape diversity.

SUSTAINABILITY

The issue of developing measures of sustainability, in its widest sense, to plantations is one that is spoken about frequently, but is still largely undeveloped. Suitable, easily and rapidly applied, measurement and assessment techniques are needed for a wide range of non-timber products-foliage, mosses, fungi and dead wood as habitats are just a few.

Britain, with its twentieth century tradition and culture of plantation forestry, is unusual in Europe in not monitoring volume growth, or increment, in timber production, particularly broadleaved timber production. All felling has, up to now, been regulated by area rather than volume because this is the way plantation/ clear cutting foresters think. Area control is associated with clear felling, and volume control to uneven-aged systems. A change must be made where moves to continuous cover systems are introduced. The recently developed Forest Stewardship Council standard for Britain states that, for certified forests, the accuracy of growth and yield estimates should be appropriate to the scale and intensity of the operation. Thus, for example, estimates based on past experience will be acceptable for small woods, while in large forests much more detail will be required. A fundamentally important aspect is *to conserve the productivity of the site* rather than controlling yield alone, through careful planning of felling, sensitive harvesting and full regeneration of the felled areas, avoiding damage to the site from ruts, erosion, excessive nutrient removal in biomass, leaching or compaction of the soil.

The issue of sustainability has also raised questions about appropriate methods of disposing of lop and top, and of whole tree harvesting. Generally, burning and the removal of whole trees are to be avoided.

HERBICIDES AND INSECTICIDES

Chemical herbicides, especially glyphosate, provide a cheap and effective method of weed control. Although care must be exercised when applying chemicals, where tree shelters are used this is much easier. The combination of tree shelters (with appropriate species) and weed control is particularly effective in promoting very rapid early growth. The selection

of herbicides in relation to target vegetation and method of application is now sophisticated (Willoughby and Brown 1995).

Expenditure on weeding has tended to decrease steadily since the mid 1960s. This can be attributed to the advent of chemical herbicides and tree shelters. Chemicals have often reduced the need for grass/herb weedings to one per season where two or three hand weedings were necessary before. Significant reductions in the establishment period have resulted, caused, as well, by more effective use of fertilisers, cultivation, and more appropriate sizes of planting stock, spacings and species. These have also saved expenditure on weeding.

The current desire to move away from the use of herbicides, even where their use is controlled and targeted and only 'safe' chemicals are used, is one that will cause serious problems in Britain where weed growth is prolific, especially in the lowlands. It is an area that requires serious research if cost effective solutions are to be found.

Apart from forest nurseries, the use of insecticides is less problematic, since acceptable means of biological control, or simple forest hygiene have been developed for many of the most threatening pests. For example the great spruce bark beetle, introduced in the late 1970s, is now adequately controlled by introduced predators (Speight and Wainhouse 1989). One pest, the pine weevil (*Hylobius abietis*), is very serious in replanted coniferous areas and causes considerable mortality. It will become more common as first rotations come to an end. Techniques for controlling it without insecticides are not adequately developed, though some progress is being made in Sweden, where it is an equal problem (Savill *et al.* 1997).

DEER

If uncontrolled, many species of deer cause considerable damage by browsing young trees, stripping bark, and fraying. They can prevent satisfactory regeneration and cause diseases. Numbers of deer (as well as an understanding of their ecology), have increased enormously since the 1970s to the serious detriment of regeneration—both planted and natural—yet policies and practices for controlling them are not well developed. Even methods for assessing numbers accurately are not known. They are regarded as extremely serious pests in Great Britain.

The species of deer that are most damaging are roe deer (*Capreolus capreolus*), fallow deer (*Dama dama*), red deer (*Cervus elaphus*), Sika deer (*Cervus nippon*), and muntjac deer (*Munticus reevsei*). They are probably the second most important influences affecting the viability of forestry, wind being the first.

In very big forests numbers can, to some extent, be predicted by the proportion of forage to cover and its arrangement in space and time. These are the primary factors determining population levels (Thomas *et al.* 1976). Deer are able to respond to beneficial changes in the environment by breeding very rapidly and by immigration to favourable habitats. Increases in the amount of browse that occurs at felling at the end of a rotation, makes conditions particularly favourable. Some studies have shown that amounts of browse increase by 10 to 50 times between the time of clear felling an overstorey and canopy closing in the next crop. The foresters' task is to keep browsing at a level at which vegetation can provide food for the deer but allow the development of an adequate number of seedlings.

Many species of deer are adapted to living in forest edges, on the borders of open land, or ground with a partial tree cover rather than full cover or open ground (Mitchell and McCowan 1986). Forest edges are particularly vulnerable in a strip 50 to 200 m wide, depending

on the species of deer. The intensification of management, heightened interest in conservation and increased recreational use of forests have increased the densities of roads, footpaths, picnic sites and other openings and these additional edges all favour deer.

Failure to take account of the ecological needs of deer populations and to design forest layouts that facilitate their management can lead to high and often ineffective expenditure on protection by fencing and difficult shooting. Good forest design can minimize damage and enable what shooting is necessary to be done relatively easily and even profitably. Unfortunately, a detailed understanding of what constitutes effective design of forests in these respects is not entirely clear.

Fencing vulnerable areas is usually a last resort because it is so expensive (about £5 per lineal metre) and ineffective over long periods. Chemical repellents and individual tree shelters of various kinds can be effective on young trees, to prevent browsing, but are also expensive and should be confined to use with small numbers of trees. Shelters can also be used in pockets of natural regeneration where stocking is inadequate.

The use of appropriate silviculture is a major requirement for controlling damage. Practices that ensure that young trees pass rapidly through the period of vulnerability to browsing before deer populations have built up excessively can be helpful. This could, for example, include fertilising, careful weeding and the use of shelters on appropriate sites. Where deer populations are already high, protection is limited mainly to the use of physical barriers to protect seedlings.

The only long-term solution is to bring numbers down by shooting and then to keep them at levels the forest and regeneration can withstand.

GREY SQUIRRELS

After deer, the animal that is most damaging to broadleaved trees is the exotic north east American grey squirrel (*Scirius carolinensis).* It causes serious damage to many trees between the ages of about 20–40 by stripping bark, resulting in decay and even death. *Quercus, Fagus* and *Acer* are particularly vulnerable. The only currently widely used and successful means of control is to use the anti-coagulant poison warfarin (more commonly used for poisoning rats). This is supplied in specially designed hoppers that allow entry to grey squirrels only but not the native red squirrel (*Scirius vulgaris*) which is now a protected species, or other animals.

New approaches to both deer and squirrel control are urgently needed.

REALITY

As Staples wrote on 12 May in Bio-Net News: “in recent years foresters have become much less arrogant about believing that they are the only ones able or qualified to manage all aspects of what goes on in forests.” They now accept that others also have legitimate views and aspirations as to what they want from their forests. These include taxpayers, as well as more specific interests such as ecologists and ornithologists. There is beginning to be a change from large scale clear felling of monocultures to more uneven-aged and polyspecific management practices. Landscape and recreation values are perceived as being much more important than in the past. In short, foresters have realised that there are more products in woodlands than just timber. Insects are now more likely to be controlled by natural predators than by drowning them in pesticides.

On the more negative side, the more environmentally friendly approaches that are required, being more intensive, tend to be more costly and they have to be paid for. The reality is that prices for timber are lower by almost 50% than 15 years ago, and the major tax incentives for forestry that British owners used to enjoy have vanished in favour of much less favourable grants. A large part of Britain's forests is unmanaged—possibly half the broadleaved woodland area. There is a decline in the number of forestry contractors to do the necessary work, due to low pay and difficult conditions. In the short term, at least, one wonders how much progress will be made.

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