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THE CORK REPORT

A Study on the Economics of Cork

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on behalf of the
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Introduction

The RSPB has publicly expressed concern that the increasing use of synthetic closures in wine bottles - in place of natural cork - may threaten the wildlife which relies on the cork-producing regions of Spain and Portugal.

Its concerns have, by and large, been rejected by retailers who are using synthetic 'corks'.

This report assesses whether such concerns are indeed justified, or whether the arguments used by retailers are correct.

It begins by looking at the ecosystems of these regions and their wildlife habitats, and the role of cork farming and its socio-economic role. It then investigates the question of 'plastic corks', and whether these pose a threat to those farming systems and habitats.

The report specifically assesses the issues raised by retailers as regards the production and quality of cork, which are used to explain the 'switch' to synthetic stoppers, and aims to establish whether there is a relationship between the diminishing use of cork and any potential threats to wildlife.

It also looks at trends within the wine industry and retail sector, before making a series of projections concerning possible future scenarios. The report concludes by asking whether the RSPB has been justified in raising its concerns.

A wide literature review was conducted, including of specialist forestry, environmental, wine industry and related publications. In addition, a number of interviews were conducted with representative academics, researchers, government officials, the wine industry, and local and international conservation agencies.

A summary of the report is provided separately.

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PART 1 - CORK FARMING: THE MONTADOS AND DEHESAS OF THE IBERIAN PENINSULA

What are Montados/Dehesas?

Large swathes of the Iberian Peninsular are dominated by what are known as 'montados' in Portugal or 'dehesas' in Spain. These terms are as much a description of the landscape as they are the names for the system of mixed farming centred around extensive oak woodlands, interspersed by areas of scrub, grasslands, 'dry' orchards and cultivated fields.

It is neither agriculture, forestry or pastoralism, but an integrated mix of all three, designed and developed over millennia to secure the greatest abundance from often harsh and inhospitable conditions, ensuring the land's continued productivity for future generations. It is, therefore, an 'agro-silvi-pastoral' system, where the land is managed sustainably for the produce of the forests, for grazing animals, and also for the growing of some crops, mainly cereals.

It is unique in that it was created by the area's inhabitants out of the Mediterranean forests, and - unlike other agricultural systems which cleared trees for farming and grazing - developed around the existing woodlands turning the area's thin soils, long, hot and dry summers, and cold, wet winters to its advantage. The indigenous oaks thrive as their primary growth period coincides with rainy seasons, particularly in spring. They provide animal feed, and their large canopy provides shade for animals in the searing summer heat. The thick leaf litter creates humus, replenishing the soil and protecting it against wind and sun, thus preserving precious groundwater.

The two main species of oak that dominate are holm oak and cork oak trees, although other oaks are also present - including the rare black, Monchique and Lusitanian oaks. The total area of dehesa in Spain is 2,248,000 hectares, of which 510,000 hectares are dominated by cork oak and the remainder by holm oak. In Portugal, there are 1,196,000 hectares of montado, of which 725,000 are pure or dominant cork oak stands, with holm oak prominent in much of the remaining area.

The definition of dehesa or montado covers a range of densities of woodland, from thick forest to more open grassland and scrub vegetation areas interspersed by trees. The average density is approximately 45 trees per hectare, although it can be 120 trees or more, and up to 60-65 per cent of the total area may be used for pastureland or growing cereals such as wheat, barley and oats.

The woodlands' understorey layers of shrubs and bushes - heather, gorse, brooms, lavender as well as rock rose and strawberry tree - provide essential sources of fuel and wild foods. The strawberry tree, for example, provides berries for alcohol and cooking fuel, and are often collected as a cash crop and exchanged at local trading posts. The rock rose provides firewood (used, for example, in traditional stone-built bread ovens outside people's homes) and - along with lavender and heather - is fed on by bees kept for pollen, honey and candle-wax.

Among the identified natural flora of the forests are 140 plants and herbs with aromatic and medicinal properties, including various types of lavender, oregano, rosemary, mint and digitalis. The harvesting of these plants and subsequent processing (through drying and distillation) is an important economic resource for local inhabitants.

Largely indigenous and well-adapted breeds of pigs, sheep, goats and cattle graze on acorns and more open areas of grassland. Pork is salted and smoked in order to provide a year-round protein source, goats provide fresh cheeses and sheep cured cheese. The forests are also sources of wild game, such as partridges and wild boar, whose controlled hunting - regulated by laws to ensure continued stocks - provides another source of food.

Yet another provider of food and income are the wild fungi associated with the oak trees which thrive in the leaf litter. Many of these are edible mushrooms - amanita caesarea, boletus aereus, boletus edulis, cantharellus cibarius, marasmius oreades, terfezia leptoderma etc - which fetch high prices in the market, and are an essential economical supplement for many families.

The economic value of the natural landscape alone is, thus, very high. From animal feed from the trees' fruits and leaves, to firewood (through pruning), from medicinal plants, aromatic herbs, mushrooms, game and pastureland, the annual 'free value' of the Iberian Peninsula's montados and dehesas is as much as £40 million a year, a figure that does not include the value of meat, honey or the popular 'medronho' liquor made from the Strawberry tree berries, and is therefore a significant cash sum within what is a predominantly 'subsistence' model of farming.[1]

The Cork Oak Forests

The most economically productive element of the montado/dehesas system, however, comes from the cork oak, a unique tree in that its bark can be carefully stripped at regular intervals without damage to the tree, and which lives on average for 170-250 years. The tree naturally loosens its outer bark from the inner cambium layer, and can be harmlessly harvested.

Over half of the world's cork oak forests (56 per cent) are found in the Iberian Peninsula. The main cork-producing regions of Spain are Andalusia (in the south) and Extremadura (to the west). Both border onto Portugal's Alentejo and Ribatejo regions, which are the country's most important cork regions.

COUNTRY	HECTARES OF PURE/DOMINANT CORK OAK FOREST	% OF WORLD TOTAL
Portugal	725,000	33
Spain	510,000	23
Algeria	460,000	21
Italy	225,000	10
Morocco	198,000	9
Tunisia	60,000	3
France	22,000	1
WORLD	2,200,000	100

Source: Cork Quality Council

Detailed regional surveys were carried out in the 1980s in both Spain and Portugal which showed where the main cork producing areas within those were countries were to be found:

COUNTRY/REGION	PURE/DOMINANT CORK (ha)	TOTAL (inc. dispersed)
PORTUGAL		
Alentejo	478,600	581,200
Ribatejo	114,800	167,100
SPAIN		
Andalucia	192,452	237,226
Extremadura	110,984	142,969

The stripping of the cork oak tree's bark is an age-old skill which has been carried out almost unchanged for 3,000 years. It is carried out by craftsmen (who use a special curved axe wielded with extraordinary precision) during the summer months of June to August, when the outer bark moves away from the

inner bark and can therefore be easily peeled away. In the more western parts of the Iberian peninsula (such as Portugal, and the Spanish provinces of Extremadura and Andalusia) - which benefit most from the humid Atlantic winds on which the cork oak tree depends for its growing cycle - this is done every 9-10 years. In other parts, such as Catalunya and more northern parts of Spain (and also in southern France and Sardinia, where there are some important cork oak forests), the interval is 12-14 years.
The art of cork-stripping is an important part of local culture, reflecting the value of the trees within local communities. Populations in the main cork growing areas often have their own language associated with the forests and their management and produce, while the 'Whistler Tree' - the world's largest cork oak - is considered within Portuguese culture as 'a national monument'.

National and regional laws (for example, the 'Lei do Montado' in Portugal, the 'Ley de Montes' in Spain and the 'Ley de la Dehesa' in Extremadura) protect the forests and forbid the unauthorised felling or grubbing up of trees. In fact, trees can normally only be cut down (and even then only with the written permission of the authorities) if they are dead or diseased. The laws also impose heavy fines for any damage or improper management of the trees and woodlands, and lay down strict rules governing the stripping and maintenance of trees. These state, for example, that a young tree cannot be stripped until it has reached a minimum of 25 years of age, and that the width of the tree must have reached a diameter of at least 70 cm at a height of 130cm. They also state that cork bark cannot be stripped above a height equal to twice the width of the trunk for the first stripping, or a maximum of three times the height for an adult tree in full production.

It is also not permitted to take cork from an adult tree's branches if these are less than 70 cm in diameter. In all cases, it is absolutely forbidden to take cork more frequently than once in every 9 years (even if an individual tree is ready for stripping sooner), and it is obligatory to paint the last number of the year in which cork was last taken from that tree on its trunk to ensure this law is observed.

There are laws governing the tilling of the soil around trees, correct pruning, and fines for neglect and mismanagement. In Portugal, the first laws protecting the cork oak tree date back to the 12th century, and in more recent times a system of rules and regulations has been enforced since 1927. Since then, the laws have been updated and revised at least thirteen times. The protection of the trees extends beyond the statute books to the local level however. Many cork strippers are members of the same local communities from where they strip cork. No stripper would be employed again if he damaged a local person's tree. There have been expressions of public outrage when evidence of illegal felling has come to light, and there is considerable controversy over the removal of trees even for purposes authorised by government authorities, such as public works.

The careful management of the forests to enable continued extraction of the cork bark helps to create the conditions for the diverse range of other produce which is produced from the woodlands. 'Management of the stands to permit cork stripping (removal of the bark) requires thinning, shape pruning and understorey clearing. All of these lend themselves to financially valuable operations. For example, thinnings and prunings provide valuable fuelwood. The cultivation of fodder and other products under the trees and the grazing of animals there is a particularly efficient way of maintaining a clear understorey.'[2]

The Uses of Cork

The bark of the cork, once stripped, is then divided up into high and low quality. The cork from the foot of the tree, as well as all cork produced from the tree's first two stripping (at a minimum of 25 and 34 years of age) is separated out and classified as low quality.

Some of the cork - mainly the lower quality - is ground up for use in a number of scientific, industrial and leisure applications. This cork is today present in NASA space shuttles, sports equipment, sound insulation materials, and motor engine gaskets. The use of such cork as an effective insulation material dates back millennia., and was used in Ancient China at around 3000 BC and in sarcophagi in Egypt.

However, much of the top quality cork - which has a very much higher value in comparison - is used as a sealant for beverages. The discovery of this application of cork dates back several centuries. It was thus used in wine and olive oil vessels in Ancient Greece, and explorers conducting an underwater

archaeological expedition off the coast of Sicily stumbled across a wine amphora thought to date from the 12th century. 'Its cork is perfectly intact', the expedition team's leader told reporters.[3] Archaeologists in London also recently found a 17th century Madeira bottle with cork and contents in perfect condition, whilst explorers have now uncovered a similarly-aged wine bottle in a Dutch warship sunk off the North Sea, also perfectly preserved.

Following Dom Perignon's now-famous adoption of cork to seal champagne, the use of cork as a bottle stopper contributed in large part to the development of wine as a mass export commodity. Today's wine industry emerged and boomed because 'cork stoppers meant that wines could be efficiently stored for long periods of time and transported over great distances. This led to the development of the wine industry in a way that otherwise might never have been possible'.[4]

The world's cork forests in all produce just under 13 billion wine and champagne corks every year.[5] Natural wine corks, despite accounting for less than 30 per cent of actual weight of cork production, account consistently for approximately 70 per cent of the value of all cork products and exports. This is because it, alone among cork products, commands regular bulk demand due to the size of today's wine industry. The production of other cork items are effectively subsidised by wine cork demand, and many such products are made literally by recycling and grinding up the leftovers of the bottle cork-making process.

When one takes into account the range of different wine and champagne corks used, such as granulated corks, the value as a proportion of production may rise even further. The latest figures show that all wine corks together account for over 85 per cent of Portuguese cork exports.

CORK EXPORTS (PORTUGAL, 1998)	000 ESCUDOS	£ MILLION
Total value of exports	143,200,962	430
Of which wine corks	125,127,000	375
Percentage (%)	87	87

Source: INE (Estatisticas do comercio externo) 1998

After the wine industry, the next most important customers of the cork forests are the building industry (e.g. floor and wall tiles - up to 15 per cent of value) and the car industry (up to 11 per cent - e.g. gaskets). Other important customers are the fisheries sector (e.g.. fishing floats), shoemakers (heels) and the aviation sector.[6]

Portugal's forests alone produce about half of all the cork in the world, and are also the most productive in terms of production per hectare. Spain's forests produce over a quarter of the world's cork. A cork forest typically produces between 8-20 arrobas per hectare (the arroba is the traditional Moorish weight, representing about 15 kg), depending on forest density and site, although a normal average is approximately 16 arrobas - 240 kg (about one quarter of a metric tonne).

COUNTRY	CORK PRODUCTION (ave. tonnes/year)	% OF WORLD TOTAL
PORTUGAL	185,000	54
SPAIN	88,000	26
ITALY	20,000	6
MOROCCO	18,000	5
ALGERIA	15,000	4
TUNISIA	9,000	3
FRANCE	5,000	1
TOTAL	340,000	100

Source: Cork Quality Council

PRODUCTIVITY (1995 comparison)

Country	cork per hectare (tonnes)
PORTUGAL	0.28
ITALY	0.26
SPAIN	0.20
TUNISIA	0.10
MOROCCO	0.06
ALGERIA	0.05
(Mean	0.16)

source: Cortica, Directory 1995/6 (Associacao Nacional dos Industriais de Exportadores de Cortica)

The Economic Importance of Cork

For Portugal, cork - alongside fruit and wine - is one of the country's most important national primary sector products. Bigger than the market for Port wine, cork exports represent 3 per cent of GDP. As well as being the world's most productive country for raw cork, much of the world's harvest from other countries - including Spain - is imported into the country for processing. As a result, 68 per cent of all cork exports originate from Portugal alone.

For individual farmers in both Spain and Portugal, income from cork represents a minimum of 30 per cent and up to a maximum of 100 per cent of all farm income. After the costs of labour, insurance and tax are deducted, the average yearly net income per hectare for farmers in Spain - for a dehesa of medium density producing cork of medium quality - is about 25,000 pesetas (about £90). In Portugal, the net income ranges from £60-110 per hectare, depending on forest density, age and location.

In the Alentejo, where population density is among the lowest in Europe, and in some districts is officially the lowest, unemployment rates are 60 per cent above the national average for Portugal. The standard of living is 32 per cent less than the European average. In this region - which covers approximately one-third of Portugal's land area - cork represents 25 per cent of the value of total agricultural and forestry activity. It is the most important 'crop', registering twice the value of all cereals, and is worth an estimated 23,000,000,000 escudos (about £75 million) pounds per year to local communities.[7] In the Alentejo and Ribatejo regions of Portugal, there are an estimated 20,000 farms and farmers (plus their families and farm labourers) who rely on cork as their main or sole source of income.[8]

In Spain also, the cork forests tend to be situated in economically more marginal areas. According to Spain's National Institute of Agricultural Research, labour employed in cork oak forests can be estimated at the equivalent about a million day's wages. In the regions of Andalusia and Extremadura, there are at least 10,000 cork farmers.[9] If one adds to this number the regions of the Algarve, northern Portugal, Catalunya, the Costa Valenciana area and other pockets, it is not unreasonable to assume that the total is as high as 40,000 or more in the Iberian Peninsula.

The impact of cork is particularly strong within certain pockets of the main cork-producing regions. In the Campo de Salamanca area, dehesas represent around 90 per cent of land use.[10] In the Sierra Morena hills of south west Spain, the dehesa is the most important land use, occupying 62 per cent of land area.[11] In parts of the south-west and coastal Alentejo, and western Extremadura, the montado or dehesa is virtually the only system of farming present. In these communities, almost the entire local economy depends on cork and other produce of the forests.

The cork economy also provides labour for farm-labourers, cork strippers and workers in cork-processing factories. Portuguese cork-strippers, for instance, can earn approximately 16-20,000 escudos (about £50-60) per day during the two to three months of the stripping season - a total average income of approximately £2,500. In the Alentejo, an annual income of approximately £3,000 for farm labourers is common. There are an estimated 10,000 professional cork strippers in both countries. The wages from cork stripping represent another £30 million per year.[12] The extraction and production of cork also provides an unknown number of additional people with wages - for example for loading cork and marking trees. There are also a number of jobs in cork crafts (an estimated 1,000 in Portugal alone).

'Everyone in my village is involved in either looking after cork trees or stripping them. The entire village economy depends on it. For me, I earn the same in two months stripping cork as I earn the whole of the rest of the year.'

Cork stripper, Alentejo, Portugal

In Portugal, there are approximately 22,000 full-time jobs provided in over 1,100 factories and firms (mainly in the Aveiro district, in the north of the country). The cork industry in Spain provides about 3,500 full-time jobs in 285 cork processing and producing companies (many in Catalunya). Therefore, in addition to at least 40,000 farmers, there are an additional 40,000 extractors and processors of cork in the Iberian Peninsula who rely economically on cork, as do their often extended families.

Cork and the Environment

Another dimension of the forests' value arises out of their environmental benefits to society. The ongoing demand for cork has resulted in the continued maintenance and cultivation of large areas of oak forests which are considered to be the last natural landscapes of western Europe, thus nurturing old-growth woodland areas at a time when global deforestation is a major issue.

Research has repeatedly highlighted the high risk of desertification in the Mediterranean region, a risk which is clearly visible in those areas of southern Spain and Portugal where forest cover has been cleared. The montados and dehesas perform a highly valuable task of preventing erosion of the area's thin soils as a result of rain and wind, regulating groundwater supplies, creating soil nutrients, and controlling extreme temperatures. The bark of the cork tree also reduces the risk of fire, by slowing and cooling burning scrub and forest areas, and protects the tree's own inner bark from the heat and flames.

'Cork oak forests produce several benefits to society... there are direct benefits whose value is quantified in economic terms such as: cork, wood, pasture, acorns, browse (grazing), game etc; and those of a more difficult quantification, called indirect benefits: protection against erosion, climate regulation, biodiversity, habitat for wild fauna, landscape enrichment, entertainment, nature tourism etc.'

(G. Montero, 'Economic and silvicultural aspects of cork oak forests', Medit. Silv. with emph. in Q Suber, Pinus pinea and euc sp., IUFRO meeting, Seville, May 2000)

The forests are also an important oxygen cycler and carbon fixer, and their role in containing the threat of climate change within Europe is significant. The cork oak forests of Spain and Portugal are a vital

carbon sink for the whole of Europe precisely because the dehesa and montado system covers such vast areas with these woodlands. If one were to apply the IPCC formula to the total area of montado and dehesa, and compare it to carbon emissions throughout the EU, one can say that these areas absorb a figure equivalent to approximately 1 in 60 tons of Europe's CO_2 emissions. If one were to add the cork oak forests of Italy, France and the north African Mediterranean basin, the proportion may be even greater.

The montados and dehesas are a guarantor of a diversity of habitats for flora and fauna. A vegetal formation of high evolutionary level, the forests are high in biomass, not only aerial but also subterranean. Up to 60 plant species have been recorded in metre quadrants in the montado/dehesa grasslands[13] and the skilled development of the montado/dehesa ecology has meant that today's forests actually have a greater overall biodiversity than the original Mediterranean forests from which they emerged, 'the result of a traditional and harmonious use of the environment.'[14]

Cork Forests and Wildlife

As a consequence, these woodlands are the last refuge for some of Europe's - and the world's - rarest species of plants and animals. Dr Mario Diaz, Associate Professor of Zoology at Castilla-La Mancha University, and an expert on dehesa biodiversity, says this is because 'these habitats are the result of the application of traditional practices, from which results a mosaic of environments with which are associated an extraordinary diversity of animals and plants.[15] The recent IUCN report on endangered wildlife revealed that there were more rare species of birds and mammals (139) in Portugal than anywhere else in Europe. The report put Spain in second place, with 100.

A number of species of birds of prey and smaller birds depend on the montado/dehesa habitats, because - says Spanish ornithologist Dolores Hedo -'the cork oak forests are the biggest wilderness woodlands left in Europe.'[16] The forests provide sturdy, tranquil nesting sites, whilst the grasslands are ideal hunting grounds. The scrub areas are the often ideal breeding grounds for prey, such as rabbits.

For example, there is a unique population of the endangered Bonelli's eagle in Portugal which has adapted to nesting almost solely in cork oak trees. The big, open canopy of the trees provides nesting spots, whilst the tranquillity of the woods is conducive to breeding. The gnarled, holey bark of the tree is a convenient source of insects for feeding.

Southern Portugal also has a small Golden Eagle population, and thriving peregrine falcon and griffon vulture populations in the montados, a semi-perennial home to other threatened species such as the red kite and lesser kestrel. The common buzzard, honey buzzard and black-winged kites are also to be found in the montados, as is the black stork, of which there are just 62 breeding pairs in Portugal.[17]

In Spain, meanwhile, the Imperial Eagle - of which just 130 nesting pairs remain - has been identified as a regular inhabitant of the cork oak woodlands. Probably the most threatened single species in the Iberian Peninsula (with the possible exception of the Iberian lynx - see below), it is one of seven birds of prey in serious danger of extinction. Its main areas of occupation are the dehesa-dominated landscapes of Extremadura, Andalucia and Castilla-La Mancha/Castilla-Leon. According to biologists, it could disappear within the next ten years.

Other vulnerable birds which regularly or permanently inhabit the woodlands are the short-toed eagle (rare), Booted Eagle (rare), turtle dove (declining), Thekla larks (vulnerable), orphan warblers (vulnerable), spotted fly catchers (declining), barn owls (declining), woodlarks (vulnerable), the great grey shrike (declining), and the woodchat shrike (vulnerable).[18] The dehesas are also the ideal winter habitat for millions of migratory birds, such as robins, thrushes, chaffinches, woodpeckers, and more than 60,000 herons that come from northern Europe. (see also Annex 1)

The forests are also host to an extraordinary array of mammal wildlife, including wild boars, genets (which were considered sacred in ancient Egypt), wild cats and the Egyptian mongoose. By far its most spectacular - and endangered - inhabitant is the Iberian Lynx, of which between 500-650 are thought to remain, and which is the world's most endangered carnivore and 'big cat' (rarer even that the most endangered tiger species.)

Its remaining populations are clustered in the wooded hills and scrubby montado/dehesa areas of the two countries. In Spain, the Sierra Morena and Montes de Toledo ranges in Andalucia and Extremadura are host to between 70-80 per cent of Spain's totals. Over half of Portugal's population live in the Alentejo and in the country's southern forests. In all, there are nine separate populations in the Iberian Peninsula, some of which are cross-frontier groups.

The mosaic of woodland, bush and grassland of the dehesa or montado provides the conditions for the lynx to shelter, breed and hunt, and are also the optimum habitats for their main prey, the wild rabbit (which makes up 90 per cent of the lynx diet). The cork woodlands of the Serra de Monchique, along the southern Alentejo/Algarve border, have been described by international conservation experts as 'the last forests of the Iberian Lynx'. This is also where some of the world's best quality cork is to be found. Here, the animal creates nests or burrows in the hollows of the trees, shelters in the rich layer of understorey scrub, and hunts its prey across grassland areas. The conservation of these areas, they add, 'is the last reasonable hope for the long-term survival, and eventual recovery, of the Portuguese population of Iberian Lynx.'[19]

The wide expanses typical of montados and dehesas provide for tranquillity during the breeding season, and allow the animal to travel large distances undisturbed during hunting. According to Miguel Delibes, possibly the world's leading authority on the Iberian Lynx, the partial clearance of small patches within the extensive woodland areas indirectly benefited the lynx and encouraged dense rabbit populations. Therefore the maintenance of the traditional mosaic habitats of the montado and dehesa are crucial to the lynx, which is otherwise in danger of disappearing within the next 10-30 years.[20]

IBERIAN LYNX POPULATION

COUNTRY	AREA	NOS.	TOTAL POPULATION
Portugal			40-53
	Alentejo		
	- Guadiana	4-7	
	- Vale de Sado	6-8	
	- Odemira/ Monchique	19-23	
Spain			450-650
	Andalucia		
	- Sierra Morena	300-400	
	Extremadura		
	- Montes de Toledo	75-110	
	Centre regions	90-150	

PART 2 - CURRENT ISSUES: PLASTIC CORK AND THE THREAT TO TRADITIONAL AGRICULTURE

In recent years a number of winemakers have begun to use synthetic corks or metal caps instead of traditional cork, principally in response to demand from retailers in the UK. In the last 3-4 years, the number of such (mainly) 'plastic corks' on the market has increased exponentially. Although attempts at developing plastic stoppers date back to the 1960s, it was only in 1989 that the industry emerged as a serious enterprise, and in 1991 that they began to appear on shop shelves in the UK. However, it is only after 1996-7 that they began to be relatively widespread.

Large sums of capital have been invested in launching and marketing some of these products, and in developing increasingly sophisticated 'virtual corks' that are visually almost identical to traditional cork. A number of new manufacturers have emerged, seeking a share of the estimated £500-800 million cork stopper market. Some of the larger companies are said to produce millions of synthetic corks each year. Many of them use as materials ethyl vinyl acetate, thermoplastic elastomers and other engineered synthetic polymers. There are also a number of metal (aluminium) screw-top type stoppers replacing corks in some bottles.

Among the biggest producers of plastic corks are Supremecorq (US), Nomacorc (US) and Integra (Australia). There are also another handful of companies close on the leaders' tails including Altec (France), Ecork (Norway), Cellucork (US), Guardian (US), Aegis (Australia), Neocork (US) and others, such as Tage.

The growth in the synthetic cork industry has prompted concerns that, by threatening the traditional cork industry, these new stoppers could in turn threaten the economic basis of cork farming, and thus the viability in financial terms of montado and dehesa areas. The marginal nature of such subsistence farming is already under pressure from development and alternative land uses, such as modern intensive farming. If the value of cork were to decline significantly, therefore, the need for farmers to make a living may prompt them to look to other sources of income. Few, if any of these, are likely to provide the same unique habitat conditions for wildlife species, or the same wider environmental benefits to society.

Plastic Corks Today
a) Global figures

None of the manufacturers of plastic corks release sales figures. There has also been a tendency to underestimate output and market share, both because many companies are still finding their feet in a new industry, but also perhaps because of the environmental controversy surrounding them.

For some time, sources in and around the industry have quoted an overall market share figure of approximately 1 per cent, a statistic that has remained unchanged for the last three years, although some industry spokespeople have more recently begun to use the figure of 2 per cent. Such numbers are usually cited in the context of arguing that the emergence of the plastic cork poses no immediate threat to the financial viability of the montado or dehesa.

Some journalists close to the industry, though, have recently given them a much higher percentage. At the beginning of 1999, a newspaper report published in the hometown of Supremecorq's headquarters in Seattle, Washington (USA), stated that 'synthetic corks now make up 5 percent of all wine stoppers'.[21] If the 5 per cent figure is an accurate one, then it is also an indicator of the rate of growth in the market, as plastic stoppers only entered into wide circulation less than 5 years ago, and some in the UK retail sector still believe the 1 per cent figure to be a recent one.

However, even this higher figure is itself now two years old, and industry sources confirm there has been no recent slow down in the market. Since this newspaper report was published, a number of other synthetic stopper products have entered the market, whilst the existing ones have opened new distribution points around the world. The number of wine-producing countries which the major manufacturers claim to be exporting to is also increasing. Newpak, for instance, says its Nomacorc stopper is used in over twenty countries. One company, Neocork, even has a distributor in both Spain and Portugal. Hence the figure may now be higher still.

Others also suspect the figure to be now higher than 5 per cent. One Australian wine industry source now believes the figure to be around 7 per cent[22], whilst at least one observer claims the figure is closer to 10 per cent.[23]

The lack of available data makes it difficult to assess accurately both total production figures or a market share for plastic stoppers. The only clue is provided by Supremecorq, which - in its promotional literature - claims to supply 400 wineries each year with 'hundreds of millions' of its stoppers. According to market analysts (and Supremecorq itself), the company is 'one of the biggest' in the market, and has three or four main competitors - Integra, Nomacorc and possibly also Altec (the latter uses a mix of cork and plastic, whilst all others are 100 per cent synthetic).

If we assume that' hundreds of millions' means at least 300 million, and that its main two competitors sell a similar if lesser number, say 200 million each, then we arrive at a figure of 700 million. If we add in Altec and the large number of smaller competitors, and give them an aggregate sales total of 300 million, then we can assume that the total number of plastic stoppers in use each year is in the order of 1 billion. (No allowance is made here for the use of metal caps, and for the purposes of arriving at a reasonably credible, if perhaps conservative, figure we will discount them for now.)

The Cork Quality Council says that the total number of natural corks sold last year was 'slightly less than 13 billion'. If this is an accurate figure, then we can conclude that, world-wide, the market share of synthetic and metal stoppers is somewhere in the order of 7 per cent, and at the very least 5 per cent.

b) British figures

In Britain, however, this figure is much higher. According to the manufacturers of plastic corks, British 'multiples' - the large supermarkets and off-licence chains which currently account for about 84 per cent of take-home wine sales in the UK[24] - have been one of the main driving forces in the emergence and expansion of the plastic cork industry. According to Integra, for example, 'leading supermarkets in the United Kingdom have specifically requested Integra be used time and time again in large quantities from their wine suppliers around the world'.[25] The publicity makes no other mention of retailers in other countries. Likewise, Supremecorq highlights its close relationship to British multiples, again without reference to retail chains in other countries, let alone in its native US.[26]

WHAT THEY SAY

ASDA: *'It wouldn't surprise me if in two years' time we only buy and sell wines stoppered with plastic corks or sealed with a screwcap'*

M&S: *'I can see a day when we will have no natural corks on our shelves'*

ODDBINS: *'I would like all our producers to be using alternative closures.'*

The figures given by supermarkets for the proportion of bottles now capped by plastic and/or metal vary, but overall are consistent enough to give a range. Tesco, Britain's largest retailer, uses synthetic stoppers in approximately one quarter of all its wines. Safeway has given a number of conflicting figures this year, but the range is between 10-15 per cent. Asda, which is fast challenging Tesco for supremacy of the supermarket sector, uses plastic/metal stoppers in 20 per cent of wines sold in its store.

Marks & Spencer - which was the first store to introduce plastic stoppers into the UK in 1991[27] now, according to Supremecorq, 'actively promotes synthetic corks over traditional bark corks'. Three years ago it used plastic/metal stoppers in 10 per cent of its wines, and the figure is now between 20-30 per cent. Oddbins, the country's largest off-licence chain, has been reported as being 'at the forefront of the move to persuade the industry to shift away from cork'.[28] Supremecorq also reports that Oddbins uses

its plastic corks in all wines which part of its home-delivery venture. It states that it currently uses plastic in about 5 per cent of its wine, although unofficial estimates put the real figure as much higher.

Hence, if three of the leading stores give figures of between 10-30 per cent, then we may assume that the overall average for wines sold in the UK for home consumption is in the region of 15-20 per cent. If these figures are correct, then it would suggest that the market share of plastic/metal stoppers in Britain is three times the global average.

Reasons for Plastic

There are a number of main reasons why plastic corks supermarkets say they now use plastic corks instead of natural cork.

The key reason, they state, is that natural cork can spoil a very significant proportion of all bottled wine via a chemical called 'TCA' which induces what is commonly known as 'cork taint'. This, they say, is both a problem endemic to cork, and one that has become very serious because cork harvests are unable to keep up with the rapidly-growing global wine market, and the 'overstripping' of cork trees is leading to lower-quality cork being supplied which is more likely to be 'tainted' with TCA. This, they add, is damaging to the environment and wildlife habitats.

Supermarkets believe, therefore, they are having to turn to plastic alternatives because of a shortage of cork, to eliminate the risk of 'off' wine, and that the use of plastic stoppers will contribute to improving the environment in Spain and Portugal.

They have rejected the argument that by moving away from natural cork, they could be undermining the economic basis of montados and dehesas, and in the longer term contribute to its decline. Some argue that the value of wine corks produced represents a low proportion of cork production, and that the present growth of cork forests in Europe shows there have been no negative impacts arising from the switch to plastic. Others deny that their policy may affect wildlife habitats, and point out that cork forests are protected by law and benefit from EU subsidies. Moreover, they add, there will always be a market for natural cork within the stopper market.[29]

a) Cork Supply

The figures available show that the cork harvest in Portugal and Spain has shown no fall in output over the last decade to justify the argument that there is a current lack of supply. In fact, there has been an increase, with some years showing a bumper harvest. For Portugal, the harvests have increased each year since 1996 (the year when plastics began appearing in greatest numbers), from 141 million tons (1996), to 147 million tons (1997), 150 million tons (1998), 165 million tons (1999) and an estimated 167-170 million tons for 2000.[30]

This represents an average yearly increase of over 7 per cent in the world's leading producer, and at least matches - if not outstrips - any growth in the global wine market (believed to be between 3-5 per cent per year). The 1990s have also produced some notable harvests in Spain, and overall the production of wine-quality cork is growing there. The only sector in Spain to be decreasing is the production of cork insulation tiles (pure and black agglomerate), which is not used for the manufacture of corks for bottling.

The last decade has also seen considerable EU investment in the creation of new woodlands because of their European-wide environmental value, and also by national governments to ensure that the wine industry's future needs can be met. The annual average increase in cork oak woodland land area is stated to be in the region of 3-4 per cent per year. One cork manufacturer has gone so far as to claim that the new areas of woodlands planted over the last 20 years will yield 'an equivalent of 3 billion wine corks when they come into full production'.[31]

Much of the new area has been planted under a European Union programme known as Regulation 2080/92 (which came into force in 1993). This has provided financial aid for the creation of new woodland areas and subsidies for farmers for loss of income from closing off that land in order to allow

the trees to grow undamaged by animals. There have also been programmes to aid replanting and regeneration, and increasing the density of trees, within existing forest areas.

Approximately one quarter of the money comes from national and regional governments, whilst the rest comes directly from the EU. As a result, the area of cork forest in Portugal has increased from approximately 664,000 hectares of pure/dominant cork oak woodlands in 1985, to about 725,000 today. The Portuguese government also aims to create a further 215,000 hectares of new cork oak forest areas, and improve and increase the density of another 155,000 hectares.

There have been similar efforts in Spain to repopulate cork oak groves and extend areas not already under forest cover. The campaign, known as 'El Programa de Forestacion de Tierras Agrarias', has been part funded by the EU as well as Spain's national and regional governments, and has focused on cork and other oak species indigenous to the area. According to one source, the estimated size of Spanish cork oak forests has increased by some 200,000 hectares over the last 10 years as a result of new plantings, in addition to which 180,000 hectares of low density dehesa have been intensified.[32] Before the EU regulation came into force, the regional governments of Andalucia and Extremadura financed reforestation of cork oak by around 40,000 hectares.

Under current plans, it is hoped to increase the total world area of cork oak forests from 2.2 million hectares today to 3.2 million by 2015, of which 1.45 million hectares will be in Portugal, 901,000 in Spain and 541,000 in Morocco by 2015.

The mean age of trees in current montados and dehesas is believed to be between 75-80 years. Cork oak trees are normally productive for at least 130 years of age, and often for as long as 170 years, which suggests there is plenty of cork in the existing forests in addition to the 'new cork' that will be available in the future to meet projected future demand. There are estimated to be approximately 391,000 hectares of mature cork oak forest largely not currently in production, mostly in North Africa but also in parts of Spain and France.[33]

b) The Stripping of Cork

> *' ... the cork forests of Portugal and Spain have been adversely affected by the high demands placed upon them. This has compromised the quality of the cork, and has led to the forests being exploited, which may have caused the problems with tainted cork. However with the introduction of plastic corks the forests should be able to recover, and therefore the quality of the cork will improve'*
>
> letter from supermarket

There is no evidence of overstripping taking place in Portugal or Spain, either currently or in recent years. A literature search and interviews carried out by the author uncovered no reports in either country of such incidents. None of the activist environmental organisations - including Quercus, Portugal's leading green NGO, and named specifically after the oak tree - are aware of such practices, which they would be expected to be (and would doubtless have made an issue of) had this been the case.

The laws of both countries set out strict rules (and stiff fines) which govern both the legally permitted minimum interval between different strippings of the tree's bark, and the area and quantity of bark that can be stripped. Typically, other safeguards or precautionary measures are often taken. For example, no more than 80 per cent of a forest is stripped in order to allow regeneration, and no more than one third of a cork oak stand or of an individual tree is normally stripped at any particular time. The harvesting of cork is controlled by regional forestry service directorates, to whom the harvest must be declared.

Nor does it make economic sense - from either the farmer's point of view or that of the cork buyer - for the tree to be prematurely stripped, as the bark would be of a very low value. Cork buyers usually offer a

price for the harvest according to how many wine corks they believe they will get from the total. Thinner cork would fetch a very much lower price, and indeed may simply not come off the tree at all.

Contrary to some assertions, it has been customary to strip bark down to the base of the tree. This cork is known as 'calcos', and is separated from the premium bark of the main body of the tree. The reason it is kept separate is because it will not to be used for wine corks, but instead will be ground up for industrial and/or domestic uses, such as floor tiles. One reason for stripping 'calcos' is precisely to avoid contamination of the rest of the tree from fungal sources which may be present near the base, hence ensuring that the tree is less likely as a whole to suffer from any quality problems resulting from the bark.

According to academic researchers, the act of cork stripping does no harm either to the tree or to surrounding ecosystems. 'Cork farming has existed for hundreds of years and it does no damage to the natural ecosystems of this area. On the contrary. It is a fundamental component of the traditional and sustainable agri-ecosystems, whose management involves a low disturbance of the natural environment'.[34] Because the cork oak - uniquely among trees - has 'two barks', the outer one can be safely peeled off. A tree can only be harmed if a stripper inadvertently cuts the inner bark, which - given the experience and skill of strippers - is a very rare occurrence, and certainly not commonplace.

From the point of view of the cork processing industry, recent technological innovations make it possible to produce more quality corks per tree or tonne of bark produced. For example, the so-called '1+1 cork' consists of a main body of ground cork capped by two discs of pure cork at either end, ensuring the part that is in contact with wine and exposed to air is premium quality cork.

c) Environmental issues

'Any 'crop' grown for harvest, and cork oaks definitely fall into this category, is not an effective means of supporting natural and diverse ranges of wildlife by virtue of the need to cut them down.'
- letter from supermarket

'Because of all the damage that the cork producers are doing to the forest they have also driven out the population of wild pigs. This will result in the cork producers using inorganic fertiliser which in turn damages the trees and the surrounding environment.'
- letter from supermarket

'The plastic corks we are using should actually help the environmental preservation of the cork forests.'
- letter from supermarket

'every colorful closure is environmentally friendly and recyclable'
- from web-site of plastic cork manufacturer

The production of cork requires regular intervention within the woodlands to ensure the vigour of trees, which contributes to the improvement of the environment. 'Intervention is needed to protect and defend forests from the damage and dangers to which they are exposed. ... direct production from the forests has grown with the application of forest management. In no instance has any impoverishment of the soil been observed.'[35]

Researchers say that the demand for cork also helps to enhance the overall ecological value of the forests. 'Cork oak forests productions require correct silvicultural treatments to allow and guarantee persistence and biodiversity.' This includes cork oak forest regeneration, thinning and first formation pruning, second thinning and second formation pruning, maintaining and regulating density in yielding stands, maintenance pruning, and cork barking itself.[36]

It is quite false to claim that cork forestry involves the felling of the trees (as the store responsible has now acknowledged). What another retailer means by the 'driving out of wild pigs' is unclear. Either it refers to the area's indigenous black pigs - which certainly roam the forest, grazing on the sweet tannin-

free acorns that create the unique flavour of the region's famous smoked hams, but which at night return to their pig-sties and so are not wild; or it refers to the wild boar, which is certainly wild, but whose numbers are actually increasing.

The claim that moving away from cork to plastic will aid the preservation of the forests has been refuted by experts in the field. 'The preservation of the montados and cork forests depends on its economic value as a source of cork for wine bottles. If these are substituted, that value diminishes, and in the longer term the loss of its economic utility will create pressure for replacing the cork oak stands with other uses for the land.'[37] There is, moreover, no evidence at all that artificial fertilisers are routinely used in cork oak forests, as suggested by another retailer.

'Cork forestry is a centuries-old practice that preserves and even enhances the environment of this area. '

Dr. Helena Freitas, University of Coimbra

The suggestion that plastic corks are an environmentally preferable option does not stand up to serious scrutiny. By and large, they are the by-product of the petrochemical industry (which contributes to global warming and consequently habitat destruction), whilst cork is a natural and sustainable product. There is little energy consumption required for the extraction and processing of natural cork (hand-stripping, boiling, drying, punching and washing), whereas the manufacture of plastic stoppers requires large inputs of energy and expensive machinery.

Clearly responding to the environmental concerns of today's consumers, many manufacturers (and supermarkets) have stated that plastic corks are recyclable, or describe them as 'an alternative technology' - a phrase usually reserved for referring to environmentally friendly or energy saving techniques and products. (One plastic cork manufacturer - following recent press reports of the potential threat to bird habitats from the increasing use of plastic corks - now features a picture of a bird on top of a bottle stopped with its product.)

Plastic corks can be recycled in theory, but in practice they are not, as the plastics industry itself points out. 'There is no evidence that they are recycled as corks, and they are a low value product for reclamation. Whilst it would be theoretically possible for them to be used in products such as garden benches, which use bulk plastic waste, there are few applications for this type of plastic. They would be prohibitively expensive to collect, and it would not be worthwhile for even the supermarkets or wine retailers to collect because of their small size and low weight.'[38]

In fact, out of 478 local authorities in Britain, there are just 17 which have advanced plastic recycling programs.[39] The London Borough of Greenwich, one of just 2 such authorities in London, is recognised as the market leader in plastic collection and reclamation, and says: 'The buyers of waste plastic that we sell on to only want certain types of plastic. We cannot separate out plastic corks, and I am not aware of any other local authority that can or does. It would simply be too labour intensive and expensive to separate out plastic corks and we certainly do not have the resources to set up an entirely separate collection system'.[40]

None of the supermarkets questioned have a plastic cork recycling programme, and one states that there are 'none available in the UK'.[41] Consumer groups have also made their position clear in this respect. 'Plastic corks in their millions are likely to remain in landfills indefinitely for future generations to deal with.'[42]

d) 'Cork Taint'

'The reason we use both plastic and synthetic corks in an estimated 20 per cent of our wine is due to the fact that up to 10 per cent of the wine bottled with natural cork is affected by 'cork taint'
- letter from supermarket

'Due to the porous nature of regular corks, bacteria can penetrate the cork and lead to 'off' flavours

The most common - and highly-publicised - justification given for the switch to plastic corks is the claim that natural corks can spoil substantial quantities of wine. The figures given by supermarkets for the percentage of wines currently spoilt by corks vary widely, from 4 per cent[43] to 12 per cent.[44] One store replied that 'we do not quote these figures because although we believe they are accurate they are not independently verified by an outside body.'[45]

Indeed many, if not all, retailers are actually unable to prove they have ever had a bottle spoilt by a contaminated cork because - as one supermarket official privately admitted - bottles returned by dissatisfied customers are never subsequently tested using chemical analysis techniques.

The phrase 'corked wine' is one used to cover a range of problems with wine, of which a faulty cork is one, and even in this case there is strong evidence that the cork itself is in many cases not to blame. In recent years advances in cork technology and processing practices have virtually eliminated the cork-related problems, according to wine experts.

TCA is a naturally occurring mould-based organic chemical compound found in a number of packaged foods and drinks, such as tea, bottled water, bread, canned soft drinks, as well as grapes. It is harmless, being formed - says a wine industry publication - 'by the chemical reaction of phenols (organic compounds present in cork, grapes and other plants) with moulds and chlorine. These compounds are common in industrialised society.'[46] As a result, TCA can sometimes be introduced into wine by the cork, giving it a musty smell which is what is known as 'cork taint'.

Scientists have found that TCA can be introduced into the wine through a number of other mediums besides cork - such as contaminated winemaking or bottling equipment, storage facilities and cellars. 'The majority of ('cork taint') faults could have been eliminated if the bottling and storage of bottles had taken place in good conditions'. According to this study, the human sense of smell commonly confuses 'off' aromas with 'cork mustiness' and therefore 'attributes all perceptions of 'mustiness' to corks'. Moreover, they add, 'there are several known types of odours and musty tastes, and certainly some unknown ones, without the cork as cause ever having been established.'[47] Their report identified no fewer than 8 'musty' aromas that could be confused with 'cork taint' but which had nothing to do with the cork.

However, TCA has been found in cork bark, and this is the centrepiece of the critics' argument. As a natural product, cork is naturally susceptible to faults, including contamination and moulds. However, it now appears that it may not be true to say that TCA is endemic to cork oak bark. Researchers have found that when it is found on a cork tree, it is present on the outer surface of the bark rather than the inner layers, or at the foot of the tree rather than higher up, suggesting an external source of contamination.

The chlorine based compounds thought to cause TCA to form are increasingly present in modern society, and may be introduced into the otherwise unpolluted Spanish and Portuguese countryside by rainwater polluted from elsewhere e.g. northern Europe, and then leach into cork through wind or soil absorption. Figures suggest that the average amount of chlorine deposition on soil rose from 5.5 kg per hectare in 1957 to 124.9 kg per hectare in 1979.[48] Chlorine and chlorine-based compounds are now an everyday presence, and are in tap water and soils.

'Wine also suffers from defects unrelated to cork taint. Difficult vintages, incompetent winemaking, improper bottling techniques and poor storage can all leave their marks. Often, a sound wine merely fails to fulfil expectations.'

('Are you ready for the new cork?', Wine Spectator, Nov 15, 1998)

Many purported cases of TCA/cork taint have, however, subsequently exonerated the cork. In 1996, a leading supermarket ran an 'education campaign' about the risks of cork taint. Soon after, they started receiving returns from dissatisfied customers saying their wine was indeed suffering from cork taint. However, the wines in question were in 'tetrapak' milk-style cartons.[49]

Other studies have repeatedly found TCA or taint in wine that had yet to come into contact with cork. One major global outbreak of TCA has now been traced back to the treatment of wine barrels with an insecticide, causing widespread contamination. The scandal was hushed up for years, and could have affected millions of bottles from as far away as France, Australia, the US and even Spain.

It has also been shown that corks can become tainted with TCA long after they have left factories in Spain and Portugal. According to cork technologists, 'the use of the stoppers in the winery or at the point of bottling is a key step where problems can be introduced. The way that the cork stoppers are stored prior to use is important in that contamination from musty environments, such as those found in wine cellars, can occur readily.' They add that 'any other component of the total pack can introduce the TCA or taint by contamination from the environment, this includes the glass of the bottle and the liquid contents themselves.' [50] There is also a suspicion that TCA could be linked to the insecticide prochloraz which is not used in cork forests but may be present in some vineyards.

Nevertheless, the cork industry has in recent years taken a number of steps to reduce the risk of TCA contamination arising from the production and processing of cork. There is now an international cork quality code of practice, which 115 top cork producing companies have signed up to.[51] A number of companies, covering 75 per cent of corks produced, have acquired ISO9002 certification, and several have invested large sums in developing innovative technologies aimed at eliminating the proportion of TCA for which the cork can be held responsible.

For example, Italcork Inc, one of the world's biggest cork suppliers, claims to produce 99.9 per cent taint free corks. Amorim, the world's largest cork company, has developed a process called INOS II which is said to eliminate TCA from cork discs via a process known as hydrodynamic extraction. It is also developing a coating on the corks which will act as a barrier to TCA.

Another manufacturer, Juvenal Ferreira, has invented a microwaving technique that treats and sterilises the cork non-chemically, whilst there are also experiments using ozone to clean corks (ozone is used in a number of food packaging industries). Scientists in Germany, meanwhile, are using enzymes, and a cork manufacturer that is using the process claims to have a zero-fault rate since they started using it in May 1999.[52] In all, the world's cork companies are said to have invested about £300 million over the last few years in improvements, technological innovations, research, and quality control.[53]

According to the wine trade press, the results are showing. 'It (TCA) is simply not the problem it was a few years ago', reported one winemaker.[54] 'In Portugal, where 80 per cent of the world's cork is produced, improved factory sanitation, quality control and technological advances - like replacing chlorine with hydrogen peroxide as a disinfectant - have contributed to a steep decline in the incidence of corked bottles over the last decade,' reported a wine industry journal.[55]

This, say wine trade insiders, is because improvements have taken place right along the production line. 'Since 1990, better forest management as well as improvements in quality control up to international ISO standards at all phases of harvest, production, shipping and storage have had a positive impact on the condition of natural bark closures'.[56]

'Truth is,' adds yet another publication, 'the industry has for the past few years devoted enormous resources on research into cork taint, cleaned up its processing techniques, modernised equipment and instituted a voluntary Code of Manufacturing Practice to prove it is serious.'[57]

A survey by the author appears to confirm that the rate of TCA in wine arising from the cork may in fact be much lower than that claimed by retailers. According to Philip Bailey (Production Director) of Corby Bottlers, one of the largest bottling companies in the UK and one of main suppliers to supermarkets: 'We bottle about 5 million wine bottles a year. Incidences of TCA are very rare. In fact we've never had a recall in the last 10 years. I would say that TCA incidence is way less than 1 per cent. It can easily be confused with oxidisation. For example, we sometimes get bag and box wine returned to us because it is said to be 'corked'. The 'mustiness' (said to be imparted by TCA-tainted corks) may often not be in the cork but in the wine.'[58]

Perkins Closures, the biggest wine stopper supplier in Britain, agrees. 'I have had very few problems with TCA over the years,' says Ian Perkins, the company's director. 'Last year I supplied 30 million corks. This year I will supply about 22 million corks. In other words, I have lost 8 million corks in the last 12 months because supermarkets - particularly Tesco, Safeway and also Asda - are switching to plastic. A lot of it is simply unnecessary. We have a very good record. The supermarkets have got an attitude of purism that is over the top and not got the balance.'[59]

Gloucestershire-based Three Choirs Vineyard is believed to be the biggest in England, and also reports few problems with cork. 'I am confident that if you buy good cork then there is little risk of problems. Out of 20,000 cases of wine produced here each year, there will only be two or three with corked wine in it.'[60] If this figure is to be believed, the rate of 'cork taint' at Three Choirs Vineyard is 0.01 per cent, a far cry from retailers' claims. Three Choirs Vineyards add that they experimented with using plastic corks, but returned to natural cork after experiencing a number of quality problems with synthetic stoppers.

A recent survey of wine service staff at prestigious British establishments also appears to confirm that real TCA levels are in much lower than those claimed by retailers. Participants at the 1999 Champagne Ruinart Sommelier competition, which included representatives from the Cafe Royal in Regent Street, the Dorchester Hotel Grill Room in Park Lasner and the De Vere hotel chain said they found only 0.4-0.8 per cent of bottles opened contained TCA. One respondent reportedly had found only 2 affected bottles out of nearly 3,500 opened in the course of a year.

John Corbett Milward, director of the Wine and Spirits Association, is another wine industry figure who has doubts whether TCA in corks is responsible for the large numbers of spoilt wine bottles that has been claimed. 'A lot of assumptions have been made about TCA in corks. There has been a tendency among retailers to dish out replacement bottles of wine said to be tainted when they are not. Often it is simply because the customer did not like the wine or bought it thinking it was one thing and then it turned out to be something other than what they expected it to be.

'It is important to get away from the notion of cork being responsible for all wine spoilage. TCA can come from plastic corks and natural corks alike, it can come from unhygienic wineries, it can be prevalent in the atmosphere, and can attach to wines during vulnerable parts of the processing, bottling and packaging stages of winemaking.' he added. 'We need to look at taint in wine and not just in closures'.[61]

i) Mistaken identity?

The problem, say the experts, is that it is often very hard to correctly identify TCA, let alone distinguish it from other types of wine spoilage by the 'sniff test' alone. According to Corkwise, Britain's leading wine quality analysts, the levels of TCA from cork are very low, and the trend shows it is decreasing further.[62]

In March of last year, Corkwise conducted an experiment involving 91 of Britain's top wine experts. Asked to assess a handful of wines - one of which was in perfect condition, one was 'tainted' with TCA, another which was oxidised, and another two with other common wine faults (acetic and mouldy bottle) - .only 2 of those present correctly identified the one that was TCA-tainted. In fact, nearly three-quarters got either none or just one right.[63]

Corkwise - which (despite it's name) is independent of the cork industry, winemakers and the retail sector alike - tests between 15-20,000 bottles of wine every year. It is the only independent laboratory

of its kind in the UK, and its findings have confirmed that cork may be responsible for only a tiny fraction of purportedly 'corked' or 'tainted' wines.

According to Geoff Taylor, its Director, 'cork is an easy thing to blame and has been so for many years. It has been used to excuse many faults such as simple oxidising, too much preservative in the wine, or wine going slightly acetic. It is amazing how many times we get a note with the wine saying it is TCA, and when we analyse it is something else. Mistaken identity is a serious issue. I have seen cork blamed for so many things over the years.

'Cork taint is actually a rarity, and accounts for a low proportion of spoilt wines. To say that TCA is in 10 per cent of wines, as has been claimed, is a vast exaggeration. It is less than 1 per cent, maybe 0.5 per cent, and if anything the figures are going down.'[64]

Its tests have also uncovered another source of wine spoilage, which may be responsible for affecting up to 10 per cent of wines sold in British stores. According to its investigations, the primary cause of wine spoilage in the UK today is in fact premature oxidisation.

'The problem arises from insufficient preservative introduced into the wine at the time of bottling, followed by lengthy and/or inappropriate storage times and methods.'

'This is partly because of environmental pressures from consumers to lower the use of food and drink preservatives, and partly because British stores are increasingly sourcing wine from further away, such as the US, Australia and South America. By the time it is bought and drunk by consumers, a period of 6 months or more may have elapsed.'

According to Corkwise, this type of spoilage is much more prevalent than spoilage resulting from faults in corks, for which it can easily be mistaken, and currently accounts for 'somewhere between 1-10 per cent of all wines' - a figure virtually identical to supermarkets' current figures for TCA.

He says that the key to tackling the problem of wine spoilage in the UK today is not to replace the stopper, but instead to improve procedures along the chain of supply, and ensure that the wine is bottled at the optimum time and carries on through the system as quickly as possible. 'People simply don't like to talk about oxidisation, which is surprising really,' he adds.

Other commentators have concurred that 'new winemaking trends could be increasing, not decreasing, the potential for faults to occur. At the cheaper end of the market, we have seen the arrival of 'early release' white wines made to be drunk as young as possible. While there is no problem if these wines move off the shelves fast, after a relatively short life (often as little as six months) the aromas and flavours fall away and the risk of oxidisation can increase dramatically.'[65]

ii) The 'Media Cry'

The process which led to the identification by supermarkets of TCA in corks as the main problem, prompting the switch to plastic, further highlights the lack of evidence to support this theory.

In 1997, one of the big supermarkets sent a letter to all its suppliers in which it complained about 'the failure rate of natural corks'. It reported that 'the media have taken up the cry' and lamented 'we can only agree and are determined to take clear action'. The action it proposed was, firstly, that certain types of cork 'will not be tolerated in wines'. Secondly, that its first preference from now on was bottles capped with 'Supremecorq, Aegis, E-Cork, Anthony Smith & Associates,' (all plastic corks), plus 'Screwcap' and only certain types of cork.

The 'media cry' to which it referred was not the result of credible independent scientific findings reported in the specialist press, but overwhelmingly a series of unsubstantiated press attacks on cork, where the supermarkets themselves were the most commonly quoted source of criticism.

An analysis of 109 media articles about cork taint and cork[66] revealed that just one quoted a qualified technician. The vast majority of press articles were printed in British (51 per cent), American (18 per

cent) and Australian (11 per cent) newspapers and magazines. In the case of Britain, the most commonly quoted source was a supermarket. In the cases of America and Australia, it was a plastic cork manufacturer (Supremecorq and Southcorp Wines and Packaging respectively). In other words, in all three cases, the 'media cry' concerning cork's problems and calling for plastic was heard primarily from companies either producing or promoting the use of plastic.

By contrast, there has been no comparable 'media cry' in those countries which have the greatest wine consumption rates (both by total volume and per capita), or which have traditionally powerful wine-producing industries, such as France and Italy for example. It would be expected that in such countries, public opinion would be quick to react if there were indeed a threat to wine from cork on the scale suggested by British retailers.

In fact, not even in the US or Australia has there been a similar 'media cry' from retailers.

iii) Does 'Plastic Taint' exist?

Another interesting point to note is that supermarkets have been primarily using plastic corks as opposed to metal screw-caps to replace natural cork. If traditional bottle stoppers really are the source of much wine spoilage, it seems contradictory that retailers have opted for plastic and not metal, which many wine journalists consider to be technically superior. The use of plastic also presents a unique range of potential threats to wine quality, but in Britain currently outnumber metal caps by a figure in the order of 5 to 1.

A number of bottlers and wineries have experienced difficulties resulting from the switch to plastic. According to Martin Fowke, of Three Choirs Vineyard: 'We have experimented with the alternatives, but we're not convinced they're as good. We had quite a lot of problems with plastic corks moving inside the bottle, the wine aged quicker, and there was more variation between different bottles of the same wine. About 10 per cent of bottles leaked.'[67]

Not even the manufacturers of plastic corks claim that their products are fault-free. Supremecorq, for example (which is considered to produce one of the more advanced plastic corks) inserts a careful 'virtually' into their publicity material in relation to its claims of being able to eliminate taint.[68] Bottlers also have complained that, because the necks of seemingly identical wine bottles can vary, plastics can cause problems. Whilst natural cork is naturally elastic, plastics are less so.

Wine researchers believe that wine under plastic develops in a different and more artificial way than wine under natural cork. Some have recently uncovered evidence of a plastic taste being imparted into the wine, whilst others warn that the plastic can actually strip the wine of its natural flavours.

For example, a study by a French laboratory found significant problems arising out of what they labelled 'plastic taint'.[69] When comparing a variety of samples of bottles capped with natural and plastic corks, the scientists found that 'upon tasting it is possible to detect an intense and unpleasant 'plastic taste'.' They did not find TCA in the naturally-corked bottles. They also found that 'in comparison with traditional natural cork, there are important differences in oxidisation levels detected in white wines stoppered with plastic stoppers after 12 months of storage.'

Wine industry journals and press reports have carried a number of articles reporting how the plastic has apparently affected the wine. Some complained of 'some decidedly odd aromas... perhaps texta pen or wet paint'.[70] Others say that 'the synthetic corks strip the flavour from the wine'[71] or that 'there was a flat, synthetic flavour with the synthetic cork wines, rather like the effect of putting Vaseline in your mouth'[72].

'The wines were brown and very weird. They had a marked plastic character,' complained another winery.[73] Journalists who compared the same wines under both plastic and natural cork found that 'those under Supremecorq appeared darker in colour and lacked the fresh fruit character of the cork samples'.[74]

In one extreme case, two Australian wineries sued an un-named plastic cork manufacturer because of alleged wine spoilage and flavour loss. They also claimed that because the plastic corks were so tightly fitted, they 'risked breakage and possible injury to purchasers struggling to remove them.'[75]

A survey of wine drinkers showed that 26 per cent of respondents believed that plastic stoppers could affect the wine. The same survey showed that 84 per cent of wine drinkers in Britain preferred cork over plastic.[76]

Premature oxidisation - which can occur in wines irrespective of the type of stopper used - may statistically be more likely to occur in plastic-topped wine. This is because the problem occurs mainly in New World wines that have further distances to travel and longer waiting times before being bought by customers. These 'new world' wines are also those that are more likely to come with a plastic stopper. Also, say the scientists, plastic corks are by their very nature more prone to oxidisation: 'Synthetic stoppers present sensorial problems and oxidation in wine when used over a long period of time as in ageing wine.'[77]

At least one British supermarket has now realised that switching from natural to plastic corks may not after all be the answer. 'Our research assumed that plastic stoppers would give a lower level of complaint with regard to 'off' flavours but the initial results indicate that this many not be the case.'[78]

Perhaps this is simply because, as one newspaper recently reported, TCA 'can also enter wine sealed with plastic, especially if the bottles are not correctly washed.'[79] Whilst the cork industry appears to have invested considerable resources into tackling possible sources of contamination, there is little evidence that this effort has been matched by the winemaking or bottling sectors.

The Real Importance of Wine Corks

> *'less than 10 per cent of the entire cork production actually goes into the making of wine stoppers, the rest going into tiles and so on….*
> *the survival of the cork oak forests does not lie entirely in the hands of the wine industry'.*
>
> - letter from off-licence chain

In fact, cork wall and floor tiles make up no more than an average of 15-20 per cent of the value of the world cork export market, whereas wine corks consistently make up 70 per cent (and sometimes more). Hence, as a UN Food and Agriculture Organisation publication put it: 'if the market demand for cork stoppers were to decrease significantly, the entire system could collapse.'[80] In Portugal, for example, the value of wine cork exports accounts for between 71-87 per cent of export sales, depending on whether or not one includes in the figure all wine cork types (including agglomerated and colmated corks, for example).

To understand fully the dependence of local communities on cork, one needs to assess the changes that have taken place in rural areas in Spain and Portugal in recent years, and in particular since both countries joined the EU in 1986. These have in fact contributed to making montado and dehesa farming even more dependent on the wine industry, and not less so.

Entry into the EU caused the value of many other products often produced as part of the montado/dehesa system to drop in value. Both countries were now open to cheap imports of meat, and pork exports were banned by the community following outbreaks of African Swine Fever. Cereal productivity levels could not compare with those of northern European countries, which are three to four times higher. As a result, cereal prices began dropping markedly (by more than 35 per cent from 1991 - 1995) and the current outlook is for continued falls. Wheat is now no longer widely grown for commercialisation, and cereals as a whole are almost exclusively grown for animal fodder.

Break down of cork market value
(Eurodollars, thousands)

Wine corks: $1,000,000
floor and wall coverings: $300,000

Farmers have to some extend been compensated by both the EU and national governments (65/35 per cent respectively) for the loss of revenue this has entailed, preventing large-scale land use conversion. However, these compensation programmes - which in the Alentejo region of Portugal account for between £60-75 million a year for local farmers[81] - a figure roughly comparable to the total value of cork production here - are due to end in 2002. Once the wheat co-financing aid disappears, within a relatively short time the average real income of farmers in the Alentejo will fall to about 50 per cent in real terms.

According to rural development agencies, cork is now literally the only output that keeps many areas afloat. 'Cork provides the principal productive activity in this area. Without cork there would be total collapse. There are simply no viable alternatives. If there were other bulk uses for cork, perhaps the situation would be different, but at the moment the landscape and these communities are virtually dependant on the wine cork industry. Cork not only creates wealth as it distributes it well. Without cork there would be no source of income for people. It would be a real crisis. Cork still makes these areas economically viable.'[82]

Some communities now rely almost entirely on cork. For villages in the Odemira district of south-west Portugal - Europe's biggest and a large producer of cork - as much as 80 per cent of the population relies on the demand for cork and income from associated woodland produce (such as medronho berries and mushroom picking) as their main or sole source of family income.[83] The effects on the local economy, shops and social facilities, would be particularly acute in such areas if demand for cork were to fall significantly over a period of time.

The Future of the Forests
a) Gains and Losses

> *'The European cork forests are in fact expanding by 4 per cent a year...'*
>
> - letter from supermarket

Retailers have argued that the cork oak forest area is currently growing, and that therefore their use of plastic has had no palpable impact on cork forestry. It is certainly true that there are new areas of 'virgin' cork forest being planted, both for their environmental value and to supply the wine industry in future years. However, there is also evidence that some existing mature woodlands are being cleared for other ventures, and that montados and dehesas are suffering from a rural exodus problem that is leading to the degradation of these areas.

According to Portugal's Forestry Directorate, about 70,000 'new' hectares of woodland were planted between 1994-98. The Spanish cork industry claims that the total cork area has increased significantly, perhaps by as much as 200,000 hectares over the last decade. Many of these planting programmes have received financial aid from both the EU and national and (in Spain's case) regional governments. Such aid has covered much of the costs of installing new woodland areas, and provides some compensation to farmers for loss of income for allowing the woodlands to grow undisturbed and unused for other agricultural practices.

However, these figures may not necessarily represent a net increase. The area of montado in Portugal between the 1950s and mid-1980s stayed relatively stable, although there was a slight overall decline (680,650 ha in 1950 to 660,920 ha in 1985) of pure/dominant cork oak stands, with more marked decreases in the districts of Santarem, Braganca and Portalegre.

From 1986-95 there were active efforts to restock and plant new cork oak stands, some partly subsidised through the EU (Regulation 2080/92). During this period, as much as 53,000 ha were planted. However, this was partly offset by fires affecting existing cork forest of 22,000 ha in areas during the same period.

It should also be noted that during the same period, 83,000 ha of new eucalyptus plantations came into existence (some also with Reg. 2080/92 funding, some with PDF funding, which is also partly EU-subsidised). Some of these were planted in areas previously covered by cork oak, while some were simply planted in and around cork forests, (which will eventually lead to the death of many such cork oaks). It is not clear whether the total cork oak woodland area figures include these plantations, as such practices may not be legal.

Because of natural mortality, disease and fire, merely to keep the total cork oak forest area roughly the same size it is necessary to replant an area equivalent to at least 5 per cent each year. If the total area planted under the different programmes which have been in place since the mid-1980s represented a net increase, then Portugal's cork oak stand would be much higher than the 725,000 hectares it is said now to cover, and Spain's area would be greater than 510,000 hectares.

> *'There has been 'a progressive degradation in our cork oak forests mainly due to progressive impoverishment and following clearing of forests that have no young trees to replace dying ones. Regeneration is to cork oak forests or 'dehesa' grazing land as machinery recovery is to industry. Both machines and trees are fungibles and should be replaced in order to perpetuate the productive unit. But a machine is 'built' in a couple of months whereas a tree needs at least 50 years to start yielding. Thus 'building a tree should start 50 years before; today, for yielding in half a century'.*
>
> Dr. Gregorio Montero, National Institute of Agricultural Research, Spain

While the overall total area may be higher than - say - 10 years ago, the proportion of younger (and therefore immature) trees may also be higher, which could represent a net loss of mature woodland if at the same time existing woodlands have been destroyed or are not being maintained through abandonment. Current statistics indicate that more than 42 per cent of the forests are 'predominantly young', whilst just 16 per cent are adult. An additional 11 per cent are said to be 'ageing'. This is positive in the sense that it ensures there will be cork forest (and therefore wine cork supplies) in the future, but may be interpreted as negative in terms of the availability of stable wildlife habitats.

It is moreover incorrect simply to assume from the figures that the rate of growth will necessarily remain constant. For example, if farmers perceive that there is little economic future in cork, then there will be little incentive to continue planting trees if by the time they are ready for harvesting there are few customers for their bark. If the prime motivation to plant areas has been to receive financial aid - for example, because the area being 'compensated' has little to offer as there are now fewer markets for the potential produce to be had from their use, as may be said to be the case with meat and cereals - then that motivation vanishes once there is no more aid to be had. Hence the recent 'boom' may be interpreted as an artificially inflated phenomenon, and one which could disappear if there is a change in EU funding regimes.

b) Corks exports and prices

A more telling question is whether there is evidence that demand for cork is showing signs of declining in relation to the wine market as a result of the growing use of plastic stoppers. Clearly it is still early days given that plastic stoppers are still a relatively recent phenomenon. The boom in the global wine market in recent years may also help to disguise a growing market share for synthetic stoppers, in that natural cork exports may remain steady or even show increases but at the same time still be losing market share.

Nevertheless, there may be signs of a 'fault line' emerging in relation to demand, which could coincide with some of the more sustained negative press attacks concerning 'cork taint'. In Spain, for example, there has been a steady increase in cork production, but natural cork exports have fallen slightly in terms of overall tonnage, and have fallen more markedly as a proportion of all cork exports. Given that natural cork (which is used predominantly in the manufacture of wine corks) commands the greatest prices, then this could suggest a worrying trend. Spanish natural cork exports fell from 37,475 tons in 1991 (just before the launch in 1992 of some the larger ranges of synthetic stoppers, such as Supremecorq) to a low of 29,163 tons in 1994. Whilst they rose to 32,676 tons in 1995, they fell again in 1996 to 30,831 tons in 1996, the year that saw the greatest number of negative press articles in the English-language print media. (Many of these articles attacked what they termed 'low quality' cork, and there has been a perception - rightly or wrongly - that Spanish cork is of a 'lower' quality than, say, Portuguese cork.)

As a proportion of total cork exports, natural cork fell from 77 per cent of total cork exports in 1991 to 55 per cent in 1996.[84] Clearly there may be other factors which can help to account for the trend, such as harvest variations, product diversification and the holding of cork stock, but the overall trend within Spain has actually been for an increase in the harvesting and production of natural cork in relation to other cork types.

The pattern in Portugal has been less clear, although again there have been slight dips in export figures in the early 1990s, and after 1996 (for example from 1998 to 1999, from 137 to 135 million tons). The fact that Portugal is a major processor of cork produced in other countries (such as Spain and North Africa) may help to mask the trend, although the mere existence of a dip at a time when the wine market has increased from year to year by approximately 3-5 per cent will suggest a possible loss of market share.

Privately, some major Portuguese cork manufacturers fear that there may already have been a loss of sales as a direct result of plastic corks. This may be explained by the fact that countries with a longer tradition of wine-making - such as France, Italy and Germany - are the cork industry's main customers, but are gradually losing their global wine market share. By contrast, 'New World' wines - which are those more likely to have synthetic stopper manufacturers and distributors (for example, the US, Australia, Chile, Argentina, South Africa) - have seen large increases in theirs.

Another market indicator is the price of cork itself. Whilst it is expected that this - as with any agricultural product - will fluctuate naturally according to harvest and other factors, there has in fact been a steady fall in the value of cork in real terms. For example, between 1989 and 1993 - when synthetic corks first appeared on the mass market - the price of cork fell not just in real as in actual terms. In 1994 came the first slight increase in actual terms, although the value in real terms was still down. This upturn may have coincided with the first new plantings following the implementing of EU Regulation 2080/92 (which came into force in 1993) which provided new subsidies for plantings, and which could in some way have provided a confidence boost to the sector.

However, prior to 1993/94, some areas of the country showed a marked increase in eucalyptus plantations, some of which took place in cork areas (even in defiance of the law) and some which skirted around the law by planting alongside existing cork areas. The installation of eucalyptus plantations with subsidies declined after 1994, coinciding with the period when cork prices on the market increased again.

Cork - actual prices: Portugal
escudos/arroba (£/arroba)

1989 = 3650 (£11.23)
1990 = 3255 (£10.02)
1991 = 2877 (£8.85)
1992 = 2753 (£8.47)
1993 = 2464 (£7.58)
1994 = 2473 (£7.61)

(baseline: 1994)

It is worth noting that, prior to this period, the price of cork had been relatively both steady and high. Between 1973 and 1987, for instance (i.e. before the 1989-92 crash) the price fluctuated between 3197 and 3213 escudos per arroba in real terms (in comparison with the 1994 baseline figure of 2473), or £9.84-9.89 compared to the 1994 baseline of £7.61.[85]

Whilst none of these figures may be said to be conclusive, they are perhaps the first indications of a change in the demand and market for cork.

c) Woodlands destruction

There has been a reported increase in illegal cork oak fellings to make way for alternative agricultural or commercial enterprises in recent years. Given the strict laws governing oak felling and grubbing up, as well the their cultural value, such occurrences may be indicative of a perceived lowering of value.

Reputable Portuguese newspapers report that 'thousands' of cork oaks are illegally felled every year to make way for more profitable ventures, of which real estate development is prominent[86] and that eucalyptus plantations are continuing to invade or replace indigenous woodlands and grassland areas of Portugal.[87]

Academics have discovered that tens of thousands of hectares of new pine plantations were installed in prime montado areas between the late 1980s to mid-1990s in sensitive parts of south-western Portugal.[88] Senior forestry officials, meanwhile, have spoken out against the massive growth of new plantations in areas previously covered by cork oak woodlands in the central Ribatejo region. 'The fact is that the eucalyptus has grown in pine and cork oak spaces and there are well-founded suspicions that the area occupied is not below 900,000 or so hectares'.[89]

Environmental groups such as Quercus also report that montados are being indiscriminately cut and replaced by eucalyptus.[90]As a consequence, they say, such plantations have swelled from an estimated 700,000 hectares in 1995, to over 1 million hectares today - an area greater than Portugal's cork oak montados. If this is so, then there are more eucalyptus (Tasmanian Blue Gum) trees in Portugal, both by number and by proportion of total land area, than in their native Tasmania.

Similar trends have been noted in Spain. According to the country's Agriculture Ministry, 'the surface area of fields, pastures and open woodlands (dehesas) has reduced palpably, at the same time that intensive agriculture and forest plantations have increased'.[91]

Given the high financial and political risk involved in such fellings (as a result of the large fines and/or public opprobrium such acts can attract), it must be assumed that the perpetrators took a calculated gamble based on primarily economic considerations - in other words, that the economic benefits outweigh any potential consequences. Before this decade such actions were virtually unheard of, and may perhaps therefore be taken as another possible indicator of a decline in the overall value of the montado/dehesa.

d) The Eucalyptus Threat

The risk of widescale substitution of indigenous woodlands with exotic plantations (such as pine and/or eucalyptus) for logging has repeatedly been highlighted as a possible consequence of a decline in cork demand.

The attraction of growing eucalyptus in the Iberian Peninsula is the plentiful demand. Europe needs a cheap local supplier of paper and wood pulp, as the costs of shipping such material are elevated. Until now the EU has relied heavily on expensive imports from countries such as Brazil, India, and Australia.

However, the problem with the installation of such plantations is that they have serious environmental consequences. Eucalyptus trees are believed to be responsible for soil erosion, lowering of water tables, increasing the risk of forest fires, eliminating natural vegetation and impoverishing wildlife habitats.

In spite of paper recycling initiatives, European demand for virgin pulp has increased massively in recent years, and future projections point to continuing growth in the market.

In Portugal, as in Spain, land is relatively cheap (especially abandoned farmland). Traditional agricultural practices are seen by the logging companies as 'marginal', and indeed some farmers have been all too willing to lease land to loggers for their use following the collapse in cereal and pork markets.

The soil and climate of many parts of these two countries is also well-suited to eucalyptus, ensuring high productivity, fast growing cycles and more frequent 'harvesting' (i.e. felling) than in some other countries. Indeed, Portugal has one of the fastest felling cycles in the world for eucalyptus - 9 years as opposed to an average of 12 years - with the area's acidic and thin chalky soils, warm climate and the availability of long sunshine hours throughout the year ensuring rapid growth.

As a consequence, prime cork-growing areas face increasing economic competition from eucalyptus and other fast-growing non-indigenous tree plantations. In Portugal, for example, the Serra de Monchique (a prime wildlife habitat area) have seen a huge expansion of such plantations, which now cover no less than 60 per cent of the total region. The proportion of eucalyptus in the Serra do Cercal - another traditional cork and wildlife area - is now 70 per cent.

Spain has also experienced a large increase. The current total area is estimated at 406,000 hectares of eucalyptus.[92] This compares to a total of 510,000 hectares of cork oak dehesas.

As in Portugal, prime dehesa and wildlife areas have been most affected. Around the hills of Sierra Morena, for instance, pine and eucalyptus (spp. camandulensis) plantations have grown rapidly over a short period[93], while in the district of Huelva there are now more eucalyptus (180,000 ha) than cork oak (59,474 ha)[94]. Andalucia and Extremadura (Spain's two main cork areas) are also the areas which have experienced the largest growth in these alternatives (with the possible exception of Galicia, which borders many of Portugal's pulp processing factories in the north).[95]

Eucalyptus and cork in Spain

Andalucia	- eucalyptus:	220,000 ha
	- cork:	237,226 ha
Extremadura	- eucalyptus:	78,000 ha
	- cork:	142,969 ha

The replacement of cork forests is a growing phenomenon in the countries of the Mediterranean basin. In Morocco, for example, cork forests are also under threat from encroaching eucalyptus plantations. In the south of France (around the Riviera area, for instance) there have been forest fires, some deliberate, to clear cork forests for other purposes. In southern Italy (e.g.. Calabria) many cork forests have simply been abandoned.

It is arguable that if it were not for the continued demand for quality cork, as well as EU Regulation 2080/92, there would be little economic reason why many more montados and dehesa areas should not be converted wholesale to such land uses. Eucalyptus and pine trees, as well as being a product for which there is secure demand, often produce at least an equal return on investment as cork but in a much shorter time.

In Portugal, for example, the average cost of planting cork or eucalyptus in a new area is roughly the same - 250-300,000 escudos (£750-£1000) per hectare. Cork receives greater subsidy than eucalyptus for the costs of new plantings - 90% versus 30% - but a farmer will see return on their non-subsidised outlay after just 9-12 years for eucalyptus. Quality cork, on the other hand, will not come off the tree for at least 43 years, and the tree may not be truly productive until it is 60-70 years of age.

If one looks at the Alentejo - the world's most productive cork growing region - one can see that, after all the various costs have been taken into account, the difference in profits spread annually is marginal, and in some cases the eucalyptus wins even without any subsidy. A study done by agricultural consultants[96] shows that while net profit for cork farming can be as low as £63 per hectare, it can be as high as £84 for eucalyptus. For pine (which is eligible for subsidy), however, the figure can be even higher, at £130.

The pattern is repeated in other cork-growing regions of Portugal. In the Ribatejo area, subsidised cork farming may return a net profit of as little as £51 per hectare, whilst eucalyptus can reach £135 (a figure higher even than pine, at £123). In the Algarve also, cork can render an annual per hectare profit of £57 in comparison to £79 for eucalyptus and £122 for pine.

A similar picture is reflected in gross earnings also. Taking Portugal as a whole, a farmer can expect to make anywhere between £150-375 per hectare per year from cork, and between £120-460 for eucalyptus.

Whilst these figures represent extremes of maximum and minimum profit, the overall pattern is for subsidised cork to be only marginally more profitable on average than unsubsidised eucalyptus in the Alentejo and the Algarve, with pine being the most profitable in both areas. In the Ribatejo, however, eucalyptus is the most profitable, more so than both subsidised cork and pine alike.

Productivity (and hence profitability) of eucalyptus in Portugal is generally higher in areas traditionally occupied by cork, especially towards the western Atlantic coast, and can be two to three times as much as in more inland areas.

Hence productivity has traditionally been lower in Spain than in Portugal. However, here too there are current economic pressures for renewed expansion. The price of eucalyptus is increasing rapidly in line with growing demand for paper and pulp. For example, in 1998 the average price was 86,500 pesetas per ton (about £315). In December 1999 the figure had risen to 96,500 pesetas (£350), and by March 2000 it stood at 103,160 pesetas (£375), an increase of 20 per cent.[97]

As a result, eucalyptus is fast becoming more profitable than pine in Spain, whilst Portugal's pulp production companies have become major players in the national economy. Portucel, which is partly state-owned by the Portuguese government, is now the world's second largest and Europe's leading producer of bleached eucalyptus pulp, and has a major share of the European market, the world's biggest. Its mill at Setubal is Europe's largest, and the company is also the country's largest private landowner, managing over 100,000 hectares, the vast majority of which is eucalyptus. Its main competitor, Soporcel, is not far behind, and owns or manages 70,000 hectares, of which the vast majority is eucalyptus.

Portugal's top 500 companies
Cork v. paper/pulp

Soporcel - rank: 21
Portucel Industrial - rank: 33
Stora Celbi - rank: 53
Papeis Inapa - rank: 96
Portucel Viana - rank: 131
Renova - rank: 139
Portucel Embalagem - rank: 184
Casca - rank: rank: 204
Amorim & Irmaos - rank: 207 (CORK)
SIAF - rank: 208
Amorim revestimentos - rank: 235 (CORK)

Portugal and Spain are now among the EU's biggest exporters of wood pulp

Portugal = 1,010,000 m^3

Spain = 660,000 m^3

Source: Estadistica del Comercio Exterior de Espana, 1996

A recent survey showed that there are now many more pulp and paper companies in Portugal's 'Top 500' than cork companies. Indeed, the only cork companies that feature in the list are three of the firms within the Amorim group, the world's largest cork company. Whilst Portugal's net income from cork came to 109,000 million escudos (£330 million), income from the paper and pulp sector totalled approximately 172,000 million escudos (£510 million).[98]

The Portuguese government's own forecasts predict an increase in eucalyptus/pine forests within the country, a vision shared by the paper and pulp industry whose capital investments rose by 227 per cent between 1998-1999.[99]

One of the consequences of the growing expanse of eucalyptus plantations in place of the traditional montado is the constant threat of forest fires. Approximately one million hectares of Portugal has burnt since 1990. The situation has become so problematic that the government has begun supplying special mobile telephones and binoculars to shepherds in more remote areas as an 'early warning' system. However, some of the more serious fires in recent years have been in important wildlife areas, affecting - for instance - Portugal's Odemira-Monchique lynx population.

The current trend also has implications for global warming. It has been estimated that a pine forest fire can release 21 tons of CO_2 per hectare.[100]

e) Dams and Irrigation

In addition to plantations for logging, there is also growing pressure from agri-businesses and developers for the conversion of traditional woodlands into cleared fields for intensive agriculture or tourism facilities, such as golf courses. A number of infrastructure schemes - many of them heavily subsidised by the EU - are either planned or already under construction. Some could result in the destruction of important wildlife habitats.

One example is the Alqueva dam currently being built in the eastern Alentejo, which will create the largest artificial lake in Europe for a projected 110,000 hectares of new irrigated fields in the region. This follows the recent trend in both Spain and Portugal of growing irrigated maize in former wheat fields (including some GM varieties) of montados and dehesas. The project, which in its entirety is estimated will eventually cost £1 billion, includes the biggest deforestation programme ever carried out in Portugal, including the felling of 50,000 cork oak trees and 100,000 holm oak trees. The area is an important lynx habitat, connecting with the western end of Spain's Sierra Morena population. However, there have been no sightings of the animal in the region since work began, and one newspaper report has speculated the local population has now become extinct altogether.

Further south near Monchique, another dam is planned in Odelouca, this time to meet projected water consumption for new tourism developments. The Odelouca area is considered to be possibly Portugal's most important lynx breeding ground.

The building of another dam at Abrilongo, near Campo Maior, has brought the Portuguese authorities into conflict with the European Commission because the area is a special protected area and home to several endangered wild bird species. A new motorway through the Alentejo also threatens to destroy an important nesting area for endangered bird species. Whilst one section of the route has been changed to avoid dividing an endangered lynx nucleus, controversy remains over its final proposed trajectory. There are also fears the road could bring urban and industrial expansion in sensitive wildlife areas in the region.

A similar phenomenon is underway in Spain, where the clearance of natural landscapes is being carried out to make way for new dams and highways in the Extremadura and Andalusia regions, many of them at the expense of vital lynx habitats.[101]

f) Rural Exodus

The number of such development schemes will doubtless increase with the decline of montado and dehesa farming. Conversely, they will further contribute to that decline by further devaluing traditional practices and systems. Rural exodus from the Alentejo and Spanish dehesa areas is not a new phenomenon, but it is currently at serious levels. Approximately 10 per cent of the active population of the Alentejo leaves the region each year, many in search of jobs in the tourist resorts of the Algarve, in cities such as Lisbon and Oporto, or abroad to France, Germany, Switzerland and Luxembourg.

The number of working farms in the Alentejo fell by 23 per cent between 1989 and 1995[102], whilst the figure for the Ribatejo is even higher at 29 per cent. Spain has experienced similar problems. Between 1987-95, the number of farms in Spain reduced by some 500,000, an annual average decrease of 4 per cent, and a total of about 30 per cent.[103] Large falls have been registered in the numbers of young farmers and farmworkers. Between 1988-97, the numbers of 16-19 and 20-29 year olds in all rural communities in Spain fell by 55.6 and 35.9 per cent respectively.[104]

> *''The cork producing areas face huge problems. Young people are being sucked out into the cities, and the consequent decay of the woodlands is leading to soil erosion problems. These areas of traditional rural landscapes represent a balanced eco-system. They are fast being replaced by industrial mono-plantations. If this continues, Portugal will become a Third World country.'*
>
> Goncalo Ribeiro Teles
> (former government minister, and forestry expert)

Such a large movement of workers from the countryside has created a number of environmental problems, as farms are abandoned and left to deteriorate. One such problem is soil erosion - for example, as dry stone wall terraces fall into disrepair, a problem accentuated by the increasing number of exotic tree plantations that have sprung up on much abandoned farmland subsequently leased to logging companies. Another serious problem is the threat of scrub invasion in montados and dehesas in the absence of regular management, which lowers biodiversity and greatly increases the risk of fire, which itself causes soil erosion as well as wildlife habitat destruction.

The rural exodus has also resulted in tragic human consequences. As the average age of rural populations increases, a serious problem of isolated and ageing farmers has emerged. This is thought to be the single main cause of the problem of suicides in the Odemira district of the Alentejo, which now has one of the highest suicide rates in the world, at 61 per 100,000. The overall Alentejo rate is 46 per 100,000, higher than the national average for Hungary, which has the highest country rate.[105]

g) Precedents

There are a number of precedents in relation to the consequences of a fall in cork demand. With Portugal's entry into the EC in 1986, the cultivation of cereals was abandoned in many montados because farmers could not compete with more productive northern European countries. This caused a surplus in supply, depressing prices, making production wholly un-competitive. Many of these cereal

fields have now been turned into eucalyptus plantations, causing the fragmentation of wildlife habitats for endangered species such as the lynx, which has been one of the principal causes of the species' decline in the last decade. With the prospect of further growth in demand in the wood pulp sector contrasted against the less certain future of the cork industry, cork woodlands may follow the path of grassland and cereal-growing areas.

Similarly, the creation of new eucalyptus plantations, which originally began in the late 1960s, slowed briefly at the end of the 1980s as a result of a sharp fall in market prices and therefore sales. However, plantations began to grow again in the 1990s because demand and value increased. Cork oak woodlands may follow a similar pattern. As cork and eucalyptus/pine make many of the same soil and climate demands, the progress of one will almost always be made at the expense of the other.

The evidence suggests that, economically, montados and dehesas are on a knife-edge, and a sharp decline in the sector's fortune could trigger a large-scale 'switch' to other land uses, whether they be agricultural, industrial or touristic, or simply increased abandonment. In Spain's regions of Extremadura and Andalucia, cattle is now becoming relatively more profitable as part of the dehesa system. The increasingly intensive rearing of cattle for beef is compensating for the fall in value of other products of the dehesa. This is leading to overgrazing, which in turn causes erosion and less cork oak regeneration. Hence as the intricate dehesa system is thrown out of balance, a spiral of decline is emerging.

New Threats

a) Changing Subsidy Regimes

The fact that cork farmers have in recent years received subsidies to plant and maintain woodlands is alone not necessarily a guarantee that the farming economy will be protected from the effects of a market decline. It been an important motivating factor in the planting of new areas, and the restocking of some existing areas, especially in the face of an increasingly competitive eucalyptus sector. This has consequently helped to conserve important wildlife habitats, as well as provide wider environmental benefits. However, this incentive may soon be largely undercut, further debilitating local economies and undermining the woodlands' future. There are even concerns it may disappear altogether.

The EU Regulation (2080/92), which entered into force in 1993, underwrites 90 per cent of the costs of tree planting, and provides financial compensation for loss of income to the farmer in exchange for an agreement to allow the woodland to grow undisturbed for a period of 20 years. This has provided an important source of income for many farmers, and has undoubtedly prevented many more areas from being lost to logging plantations.

By contrast, eucalyptus plantations have usually been eligible for only 30 per cent of installation costs (costs which are often virtually the same per hectare as for new cork woodlands) and are not eligible for loss-of-income compensation.. One of the compensations for eucalyptuses is that returns on the 70 per cent of capital investment not covered by subsidies will be seen after just 9 years, whilst the 10 per cent initial investment contributed by the cork farmer may not be recouped by the first or second strippings (at 25 and 34 years after planting), as these provide only low quality cork.

Now, though, ongoing negotiations between the EU and national governments over the next package of farming subsidies covering the period up to 2006 look set to alter the picture significantly. Under the current proposals, subsidies for installing new eucalyptus plantations will - in the main - be increased to 40 per cent, whilst the instalment subsidies for cork oaks will fall to 70 per cent.

In addition to this, a new 'sliding scale' for compensation aid is introduced for cork farmers. So whilst under the old regime, a farmer could expect to receive an additional 181-266 ECUS per hectare per year on top of the 90 per cent contribution towards planting costs, under the new scale he or she may receive as little as 27 ECUS. The sliding scale actively penalises larger-scale plantings. Only areas of 5 hectares or less will be eligible for the maximum compensation aid (which remains the same at 266 ECUS), whereas the creation of large woodlands (for example of 250 hectares) will receive the lowest amount.

A comparison of how the new system might work in practice has been carried out by agricultural consultants in Portugal. Under the new regime, the farmer of a new eucalyptus plantation might expect

to make approximately 53,000 escudos per hectare per year (about £160), whereas the farmer of a new cork woodland in the same area might make only 20,000 escudos (about £60). This provides a clear disincentive for the continued replanting and regeneration of indigenous oak woodlands and the preservation of their habitats, and has drawn angry responses from conservationists and farmers associations alike.

According to Portugal's Liga para a Proteccao da Natureza (LPN), the new system 'greatly reduces the incentive, already small, to reforest with slow-growing tree species'. Despite eucalyptus traditionally benefiting from less subsidy, 'forestation with this species has continued to dominate above all others. An increase in subsidy amounts will have an extremely nefarious effect'.[106] 'If these changes go ahead, they will drown the plans to invest in a species which is fundamental to the recovery of (these) zones and to fight desertification in the southern part of the country', added a national farming union.[107]

Although negotiations have not yet concluded, some farmers could simply instead opt for one of the new funding programmes being made available, in particular a large-scale programme to create tens of thousands of hectares of new olive groves in the Alentejo.

This effect may be compounded by the question over what happens after 2006. There is considerable uncertainty as to whether subsidies will continue to be available for cork oaks, and if so, at what level. Political speculation is rife that the 2000-2006 package of funds will be the last of this scale for Portugal and Spain, and that the expected entry of new countries into the EU (such as those from Eastern Europe) will lead to funding programmes being refocused in order to achieve greater harmonisation (in much the same way as funds are said to have been targeted towards Spain and Portugal since 1986 following their own belated entry into the EU.)

The spreading of resources may certainly make it harder for the governments of Spain and Portugal to achieve their year-on-year projected increases of cork woodlands, which would make an overall decline more likely as the lack of regeneration and densification aid causes many woodlands effectively to contract.

Such uncertainty contrasts with the very large amounts of money which are expected to continue to arrive from the EU and the European Investment Bank for large-scale projects such as the Alqueva dam, some of whose subsidiary projects (9 additional smaller dams, 680 km of irrigation canals, 114 pump stations and a hydroelectric complex) will still be under construction in 25 years time.

Alqueva will 'create' 110,000 hectares of irrigated intensive agriculture in the Alentejo (montados currently occupy some 480,000 hectares here), and the cost alone of converting land (much of it in potential conservation zones) so that it can make use of the new water supplies for intensive agriculture has been calculated at 600 million ECU.

It is also worth remembering that, on average, Portuguese farmers currently receive relatively less than their European counterparts. According to Eurostat data, the level of aid in relation to total productive value by sector shows that while for Portuguese farmers the figure is 40 per cent, the European average is approximately 56 per cent, while in France the figure is 63 per cent and that for farmers in the UK, Germany and Ireland it reaches more than 70 per cent.

It is unclear whether the change in funding regimes for cork and eucalyptus are a cause or an effect of the changing stopper market. Nevertheless it is likely that they will have profound and overwhelmingly negative impacts. As one Portuguese government minister recently stated, eucalyptus pulp production is now 'one of the most strategic sectors for this country and we have to give some signal in that direction'.[108]

b) Changing Regulations

The complex laws protecting cork oak woodlands will safeguard them - and their habitats - from any future pressure to convert as a consequence of a shift to plastic stoppers, some retailers believe.

Whilst there are indeed a number of laws and regulations that protect the forests, some are contradictory and/or rely on a number of competing authorities for enforcement and monitoring. Earlier this summer, much of the forest around the world-famous Whistler Tree (the world's largest cork oak tree, near Setubal in Portugal) was bulldozed to make way for a new holiday resort complex. In all, 411 out of the forest's 430 trees - many of them well over 100 years old - were felled. More might have been felled had it not been for the arrival of the police.

The incident highlighted the potential for contradictions within the existing law. On the one hand, Portugal's Forestry Department of the Agriculture Ministry had refused permission to remove the trees. On the other hand, the planning department of the local authority had given the go-ahead for such a development scheme. The courts have since decided that the developers must pay a fine - but this will be equivalent to the sales value of just one of the new luxury apartments to be built on the site.

The felling of this particular forest was no isolated incident, and there are indications such events may be increasing. Last year, another illegal felling operation - this time involving 500 trees - took place in the same area, also near Setubal, this time reportedly to make way for a new storage facility for imported cars.[109] Thousands of cork oak trees in other nearby districts have met the same fate within the last two years - 4,219 in Montijo, 2,369 at Palmela, 1,991 in Alcochete, and dozens of others have been reported felled at Seixal, Moita and Barreiro, bringing the total in this part of Portugal to 8,834. According to a forestry services official, 'the death of these cork oak trees was due to the business dealings of the construction industry with the connivance of local councils the majority of times and the incapacity of the forestry authorities'. In each case, the woodlands were cleared to make way for lucrative property or business ventures.

There are concerns that the latest revision of the statute in Portugal may allow for further abuses. The basis of today's legislative framework dates back to 1927, and has been successively revised. The current statute is Decreto-Lei 11/97 (14 January 1997). A draft bill to alter the law was published by Portugal's Agriculture Ministry on 14 July 2000. It reiterates that 'the environmental value of these oak species is unarguable... montados of cork and holm oak make up ecosystems which, asides from the economic value, (are) considered of great ecological importance.' The bill proposes to increase the disincentive to carry out illegal fellings by making it illegal for new developments to be constructed in areas of forest removed without permission for a period of 25 years following the act. It also sets increased fines for a number of wrongful practices including unauthorised felling or grubbing up, incorrect or untimely stripping, pruning and scrub clearance of up to 30,000,000 escudos (£100,000).

At the same time, however, concerns have been expressed by environmental groups (such as Quercus) that the new law may allow for urban expansion in coastal areas currently populated by corks if they are 'compensated' for by new plantings in more inland areas. Some such areas may be less suited to this type of woodland, and this would result in an overall loss of quality habitats.

The proposed law states that changes in land use can take place with the permission of the forestry services (DGF), or when public works or new agricultural activities are in the 'national economic interest'. According to some critics, this will allow local authorities to determine which areas can be 'developed', and - according to the Liga para a Proteccao da Natureza, 'opens the door for the destruction of montados'.[110]

Whilst current laws place a limit on the total area of pine and eucalyptus plantations allowed in individual districts, here again the process is in the hands of local authorities. There are few official data on which to base the figures because a detailed land use inventory has not been carried out for many years, and a new one is not expected to be available for another 2 years. The current figures on which the country's Agriculture Department estimates the area covered by plantations, for example, is based on data provided by logging companies, and the studies on which these were based are not in the public domain. Hence forestry officials and conservation groups alike believe that the official estimate of 700,000 hectares of eucalyptus plantations represent a deliberate underestimate, and that a truer figure is at least 900,000 hectares and may be more than 1 million hectares.

In theory, new plantations of such trees should not occupy more than 25 per cent of a new area or farm, or more than 20 continuous hectares. However a lack of resources and staff means that forestry officials

are often unable to detect new plantations or determine whether such conditions have been met, let alone enforce regulations.

There are concerns that recent policy revisions in Spain could create similar problems. Last year, the Spanish government launched its first national forestry strategy. However, environmentalists warned that it too opened the door to 'allow the felling of ancient or mature woodland in exchange for new and non-native plantations elsewhere'.[111]

Giuseppi Brundu, an Italian forestry expert, has called on the cork oak to be officially declared an endangered species.[112] There may be grounds for extending such a call to other oak species traditionally associated with the montado/dehesa. As a result of recent expansion in logging activities in the south of Portugal, the Monchique Oak is now considered a rare species.

The Threat to Wildlife Habitats

> *' any threat to the flora and fauna of the Portuguese or Spanish cork forests - including the Iberian Lynx - is most unlikely to be connected to the use of plastic corks.'*
>
> - letter from supermarket

Serious concerns that the potential consequences of a crash in the cork market on montado and dehesa economies could lead to a reduction in wildlife habitats have been refuted by retailers. However, the destruction of natural landscapes in and around traditional montado/dehesa areas has already had a severe impact on some, including the most endangered, species. As one report concluded: 'The collapse of the age-old agro-silvi-pastoral system is leading to deep changes in the structure and architecture of forest and pre-forest communities of plants and animals.'[113]

Therefore the potential for further fragmentation or outright destruction of remaining areas - for example, through the installation of logging plantations on 'marginal' farmland - could, it is believed, contribute heavily to the possible extinction of notable species of birdlife and mammals. There is apparent consensus within the scientific community as well as conservation agencies that a future collapse in montado/dehesa-farming is one of the strongest threats to some wildlife. In the case of the Iberian Lynx, the world's most endangered 'big cat', one conservation group has voiced the concern that 'without the montado, there is no hope for the lynx.'[114]

a) Birdlife

Many of the birds that inhabit the montado/dehesas are protected species under the EU Birds Directive. However they are under pressure from the growth of logging and other non-traditional activities. For the red kite, say researchers, 'eucalyptus plantations have deeply changed the habitat in central Portugal.' The Montagu's Harrier is in decline because of 'CAP policies that are changing the rural environment' (i.e. replacing cereal fields and grasslands). The goshawk has suffered because of the forest fires in eucalyptus plantations. The common buzzard still lives in remaining montados of the Alentejo, but the probable extinction of the Imperial Eagle in Portugal is as a direct result of 'degradation of breeding habitats'.[115]

The Bonelli's Eagle, which is an endangered species within Europe, has experienced a large decline in numbers. Most of the European population is located in the Iberian peninsula, with the rest scattered around the Mediterranean basin. Of the total European population of 862-1072 breeding pairs, 65 per cent are located in Spain, although the population here has fallen by 25 per cent over the last 10 years. The main threats to it here are infrastructure development, 'new leisure' activities (such as off-road rallies in perceived 'abandoned' areas), logging plantations and the loss of traditional mixed farming landscapes.

Portugal's population of 83-96 breeding pairs has suffered a 15 per cent decline over the last decade for identical reasons. About 80 per cent of country's largest population of Bonelli's Eagles nest in trees, the vast majority of which in cork oaks. In areas where traditional woodlands have been replaced by plantations, some have been forced to re-nest in eucalyptus trees, with disastrous consequences. Because of the willowy structure of the eucalyptus, a number of nests have blown off in the wind, or the birds have been killed when the trees are felled.

Some researchers now believe that the threat to the Bonelli's Eagle - with the possible exception of the Spanish Imperial Eagle - is currently greater than for any other bird of prey in Europe. For both species, the transformation of formerly stable habitats based around cork oak forests into plantations has created ecologically impoverished and unsuitable habitats. Plantations also have machines bulldozing tracks for lorries to take away the timber, which also results in a number of pairs being unable to breed because of disturbance. The constant threat of forest fires is also a major issue.[116]

The black stork - of which there are 62 breeding pairs in Portugal - is also in decline because of destruction of nesting sites in cork oak forests. Some of this is deliberate - for example, the building of the Alqueva dam will dislodge 6-8 pairs, which represents 10 per cent of the national population. The conversion of traditional landscapes into plantations, the building of irrigation channels and the creation of new irrigated fields for intensive farming are listed as the other main threats.[117]

b) Mammals

The population of the Iberian Lynx in both countries has fallen in the last ten years to about half its previous levels. In Andalucia, the current estimated population is about 300-400 (60 per cent of levels 10 years ago). In Extremadura there are thought to be between 75-110 (125 in 1988). In Castilla-La Mancha and Castilla y Leon , meanwhile, the population is now thought to number between 90-150 (less than one third of the 1988 figure).

There are now nine separate populations in Spain and Portugal divided into 48 breeding areas. All but one population now has less than 100 animals, and some have fewer than 10 females, which means they are very prone to sudden extinction. The abandoning of traditional agriculture and the subsequent rural exodus has led to many areas of countryside being covered with plantations, effectively destroying natural habitats for both the lynx and its main prey, the wild rabbit.

According to Miguel Delibes - the leading lynx expert - 'the features of modern intensive agriculture (e.g. large developments for irrigation systems, lower diversification of agricultural landscapes as constrained by mechanisation) are detrimental for the species. At the opposite extreme, the increase in scrub density following the abandonment of farming practices lowers habitat suitability for rabbits and lynx.'

For example, 'a large proportion of the potential lynx habitat in the Iberian Peninsula has been allocated to forestry' under which 'original forest (has been) extensively replaced with conifer and eucalyptus plantations for timber and wood pulp production. The shrub layer is virtually absent in eucalyptus stands and periodically removed in pine stands. Rabbits are very scarce or absent within such plantations.' He concludes by calling for the 'lynx labelling' of products from traditional dehesa/montado agriculture.[118]

An almost identical analysis is made by the ICN, Portugal's official state conservation agency. It too concludes that rabbits cannot live in eucalyptus plantations because of the lack of natural vegetation, and this has contributed to populations being unable to recover from previous outbreaks of disease. The lynx itself 'avoids artificalised habitats, namely forest plantations with exotic species and intensive farmland'.[119]

The increasing area of eucalyptus plantations has caused fragmentation of population groups, and as a result there is now evidence of increasing disease and genetic exhaustion through isolation. The government-funded report highlights the optimum habitat for the lynx provided by the montado - the created matrix of different landscapes 'such as woodlands, heathland and dense scrub' organised in 'mosaic structures, with closed areas for shelter and open ones for hunting prey'.

The main threat to the lynx in future, it adds, is 'the destruction of its shelter and reproduction habitats and the reduction in quality of its roaming habitat' through 'the removal of scrub, forestation of heathland' and 'construction of big infra-structures, urban development, enlargement of intensive agriculture areas, specifically irrigated land'.

It continues: 'These new plantations have been identified as one of the most important factors as the cause of the destruction of Mediterranean woodlands, scrubland and bush. The destruction of these types of habitats has been a cause of the fundamental regression to the current precarious situation of lynx populations, namely by provoking extensive discontinuity in areas of presence and between them...'

What is now needed is not only 'limiting or eliminating the monoculture forestry plantations' but specifically 'preserving montados, scrubland and bush in favoured (lynx) areas' as well as 'repopulating areas with indigenous tree species' (i.e. the cork oak) and 'encouraging and stimulating traditional (agricultural) activities which are compatible with the preservation of the natural environment', namely 'extensive pastoralism, extensive agriculture'.

It too calls for 'eco-labelling' of products - including corks - associated with the montado to encourage consumers to preserve the lynx's habitat. 'The symbol of the lynx should be used to encourage eco-tourism and market certain natural products which are produced as a result of activities compatible with the conservation of the lynx' such as 'cheese from pastoralism, honey and pollen from beekeeping, and cork from the montados'. Otherwise, it warns, that at the present rate, the lynx could disappear in 10-30 years time.

International organisations have now identified the woodlands of south-west Portugal as 'the last forests of the Iberian Lynx'. However, 60 per cent of the land area's total of 76,000 hectares here is now covered by eucalyptus and pine, a figure which has grown in the last 10 years and which shows no signs of slowing down. 'The conservation of the remaining natural forests … is the last reasonable hope for the long-term survival, and eventual recovery, of the Portuguese population of Iberian Lynx. ... Unfortunately the ecosystem is highly threatened, and there is a serious risk it may completely disappear in the course of the next years.'[120]

The decline in the market for cork, says one writer, could be the final blow for the lynx: 'An eventual victory for plastic corks could put at stake one of the most beautiful and rich of Portuguese landscapes… and the nation could lose much more than the billions of escudos this industry generates. ... The Iberian Lynx, various species of birds of prey and a type of vegetation characteristic of the Mediterranean could be seriously threatened.'[121]

Environmentalists have called for greater awareness among consumers about the link between cork and the lynx's prospects. 'It is necessary for the public at large, and for wine consumers in particular, to know about the relationship between the production of cork, and the biodiversity of these areas through the maintenance of the montados,' says ecologist Jose Paulo Martins.[122] 'The Iberian Lynx will not survive without the montados and dehesas', adds Helena Freitas, President of the Liga para a Proteccao da Natureza (LPN). LPN has called for measures to promote traditional land uses. 'Protecting these zones means replanting indigenous tree species... the recent increase in plantations, the majority dependent on EC subsidies, could greatly threaten the last lynx populations'.[123]

For ornithologist Helder Costa, 'the future for cork is very worrying. The current situation could lead to abandonment of montados because they are no longer profitable, and therefore a change in the law that protects them, and which in reality only currently works in theory. What makes the montados unique is that they provide a very large habitat area, and this is why it is so important for a number of important bird species, particularly birds of prey, and most especially endangered species. Conserving the montado should be a strategic priority because it is a virtually unique habitat.'[124]

PART 3 - THE FUTURE: TRENDS AND FORECASTS

The growth of 'New World' wines

The suppliers of synthetic stoppers have focused their activities on the so-called 'New World' wine producing countries. A look at main distributors of companies such as Supremecorq, Neocork, Nomacorc, Integra, Ecork - among others - shows that the focus of marketing and sales promotions of plastic corks is in this sector, which broadly speaking includes the US, Australia, New Zealand, South Africa, Argentina, Chile, and possibly also Canada. In the last few years, these countries have seen an enormous expansion in wine production, at the same time that the 'traditional' wine producing countries of western Europe - such as France, Italy, Spain and Germany - have witnessed a decline. One indicator of the trend is in the decreasing area of vineyards in these countries in recent years.

The move towards New World wine consumption is particularly notable in Britain, the world's largest wine importing country and which controls 5 per cent of the global market.[125]

Wine consumption in Britain has increased rapidly in recent years. According to market figures, average per capita consumption rose from 15.74 litres in 1990 to 21.68 litres in 1998.[126] (In 1970 the figure was just 2.87 litres.[127]) Total national consumption has continued to increase, from 8,766,000 hectolitres in 1998 to an estimated 9,513,000 hectolitres for 2000.

However, within this total, there have been significant changes in the origins of wines consumed. 'Only six years ago French, German and Italian wines together accounted for around two thirds of UK still wine consumption by both volume and value. This figure has now dropped below half and is still falling. 'New World' producers now hold over a third of the UK market. Australia is the main 'New World' source of UK imports, with a share of 14 per cent (1,209,000 hectolitres) in 1999. UK imports of US still wine have showed strong growth in recent years - particularly in 1998 which saw an increase of 44 per cent in import volume to 490,000 hectolitres.'[128]

Moreover, according to official trade reports, 'the New World wine producers (Australia, New Zealand, Chile, Argentina, South Africa, Uruguay, Canada and the United States) are taking an increasingly bigger share of the wine that Britain imports. In the 1999 calendar year, New World wines accounted for 34 per cent of Britain's imports, compared with barely 10 per cent a decade ago.'[129]

Britain's supermarkets have been in the driving seat of this change. When asked about the growth of non-western European wines sold in its stores over the last 10 years, Tesco replied: 'There has been an incredible increase. This is illustrated by our decision to appoint a Product Development Manager who is based permanently in Australia'.[130] Sainsbury agree that 'there has been a several fold increase in these sort of wines' over the same period,[131] whilst Marks & Spencer add that 'the percentage growth of non-western European wines in our store has grown in line with the market'.[132]

Imports of still wine from the EU decreased by 3.7 per cent to 5,413,000 hectolitres in 1999. Total imports of still wine from the EU are forecast to fall by around 4 per cent again in 2000 to 5,270,000 hectolitres.[133]

The four most widely-sold still light wine brands sold in Britain in 1998 were from 'New World' countries (Gallo, Hardy's, Jacob's Creek, and Stowells Wine Box), whilst the most popular wine type bought in stores for home consumption is Australian white (representing 6.6 per cent of all purchases).[134]

This pattern is clearly evident on individual supermarkets' shelves. In Safeway stores, for example, there are 22 German and 10 French white wine varieties available (a total of 32), compared to 40 Australian, 25 South African, 12 American, 12 Chilean and 12 New Zealand brands (a total of 101, or an approximate ratio of 3 to 1).

Old World vineyards		
	1995	**1997**
Spain	1196 ha	1155 ha
Italy	927	914
France	927	914
New World vineyards		
USA	305	315
Chile	123	132
South Africa	103	108
Australia	73	90

Projected 2000 imports (000 hectolitres)
(figures for 1998 in brackets)

Old World

France = 2,430 (2603) - down 7 per cent
Italy = 980 (1092) - down 10 per cent
Spain = 830 (868) - down 4 per cent

New World

Aus = 1,400 (891) - up 57 per cent
Chile = 520 (356) - up 46 per cent
South Af = 520 (410) - up 27 per cent
US = 510 (490) - up 4 per cent

Total 9,032,000 hectolitres
(8,392, 000 hectolitres)

source: UK Wine Marketing Annual, 2000 - USDA Foreign Agricultural Service, GAIN Report, 26/6/2000

Recent trends suggest that the share of New World wines in the important British market are set to increase further still:

USA
The US - currently the world's fourth largest wine producer - now has a 6 per cent share of the UK market, its most important export market worth $132 million in sales (nearly one quarter of all US exports). Large new areas of vineyards are currently being planted in California, the country's main wine-growing area.

AUSTRALIA
Australia's wine industry has expended massively in recent years (overtaking that of Portugal in terms of exports). Total wine production is expected to continue increasing. There has been a significant overall increase in exports - from 2 million hectolitres in 1998 to 2.6 million hectolitres in 1999 - which represents one third of wine production. The forecast is for these figures to increase dramatically in the next few years. In 1999, Britain accounted for 46 per cent of all exports, and there was an 80 per cent increase in volume of exports to UK between 1997-9.[135]

NEW ZEALAND
The UK now accounts for 70 per cent of all New Zealand's exports, which as a whole have increased by some 1000 per cent over the last decade, and are expected to triple to US $140 million by 2003.

CHILE
Since it first entered the UK market in 1988, Chile has increased its UK exports fifty-fold. In 1999, for the first time, the UK overtook the US to become Chile's number one export market. Between 1998-99 alone, there was a 32 per cent increase by volume of imports from Chile into the UK.

ARGENTINA
Britain continues to be Argentina's most important wine market by value, and in 1999 the UK became the biggest importer of Argentine wine (by volume) outside South America, overtaking the US. Exports to the UK rose by more than 20 per cent (by volume) from 1998-9, and from 9 to 13 per cent of Argentina's export share. Total 2000 exports are expected to increase by 25 per cent.

SOUTH AFRICA
South African wine first entered the UK market in 1990, which is now its most important export market. While the country's total wine production of about 900 million litres in 2000 represents a fall of 2 per cent from 1999 because of bad weather and fires, exports for 2000 are expected to grow by approximately 10 per cent.[136]In 1999, the UK accounted for 42.1 per cent of South African exports. There was a 14.7 per cent increase in South African imports by volume from 1998-9.

CANADA
Britain has traditionally been one of Canada's biggest customers (e.g.. in 1995 the UK bought up over half of all Canadian exports). Although in recent years Taiwan, the US, Japan and China have become important importers, there are indications the UK share of the market will increase again in future.

The 'Cork Crash'?

With the rapid recent growth of plastic stoppers, and the continuing increase in their main customers' (New World wines) share of the wine market, there has been speculation that the market share of synthetic stoppers will soon reach a point where it will cause cork to fall in price. With the possibility that the supply of cork could go into surplus relative to demand, this could then make the production of cork much less attractive to farmers, who could then opt to use their land differently (for example, for new eucalyptus plantations). This in turn could cause the synthetics' market share to increase further, resulting in a probably irreversible 'spiral of decline'.

The consensus among interviewees questioned by the author is that the 'point of rupture' at which the cork sector begins to encounter serious economic difficulties is at about the 15 per cent mark. In other words, once synthetic stoppers account for a market share of approximately 15 per cent, the surplus of cork supply is sufficient to trigger sharp price falls which result in a significant loss of income for montado and dehesa farmers.

The impact of this will, of course, be felt more strongly if in the meantime there is an overall loss of income from traditional farming systems. Two such events are the proposed elimination of wheat compensation subsidies (forecast for 2002) and potentially also cork woodland maintenance aid, which may be significantly reduced or even abolished after 2006.

With existing potential profit advantages of cork in relation to eucalyptus being further eroded under proposed EU funding regimes from next year, a price fall of any magnitude in cork will clearly have profound consequences for local farmers and communities, and therefore the long-term future of the montados and dehesas themselves.

The perceived consensus is that the volume of synthetic stoppers is increasing in the order of approximately 10 per cent per year (owing to the lack of sales figures, precise data are not available). Hence if the current total stopper market is about 14 billion natural and synthetic corks a year, and we assume the wine market continues to grow at about 4 per cent per annum (current estimates range from

3-5 per cent) and take a 7 per cent synthetic stopper market share as our starting point, then - all things being equal - their market share will reach almost 10 per cent in 2005, 12.5 per cent in 2010 and over 16 per cent by 2015.

Cork prices may start to decline at - say - a 10-12 per cent market share for synthetics (year 2010) as a surplus in cork begins to emerge, causing cork prices to fall at a rate of about 5 per cent per year. Over a five year period, this would represent a reduction in the price of cork of 25 per cent in real terms by 2015.

Market projections Total corks/plastic & metal - thousands (market share) 2005 - 17,033 /1,610 (9.4 per cent) 2010 - 20,723/2,593 (12.5 per cent) 2015 - 25,213/4,177 (16.5 per cent)

This would be a highly significant loss of overall income for farmers as - after 2002 - total income may in any case be reduced by as much as 50 per cent for individual farmers as a result of cereal compensation subsidies being withdrawn, and cork woodland aid being reduced or ended after 2006. An estimated 50-75 per cent reduction in real income in what are already economically marginal areas would mean that the pressures for large-scale land conversion of montados and dehesas would be hard to resist at this point. Hence, based on this calculation, the so-called 'point of rupture' could certainly emerge around 2015, if not before.

Chris Losh, editor of Wine Magazine, who believes that the plastic cork market currently accounts for about 5 per cent, calculates that 'that figure is likely to double every 10 years. New World wines are the ones using them most enthusiastically, and they are the ones who are taking a growing global market share and are the big volume brands.'[137] Using his model, we also reach a 15 per cent market share point around the year 2015.

The growth of metal screw-caps may also contribute to a higher market share for non-cork alternatives being achieved more quickly. According to a recent report, the screw--top 'will be at its peak after 2010'. Wine-industry sources add that a number of large new world wine suppliers will be using metal caps from next year.[138]

There is another factor to take into consideration. As well as production, wine consumption itself is gradually decreasing in the traditional 'old world' countries, but increasing in the UK and other northern European countries (i.e. in countries where plastic is more prevalent). The rapid increase in the use of plastic stoppers by British 'multiples' over the last 3-4 years suggests that at the current rate of increase, the proportion of plastic and/or metal stoppers in bottles could comfortably reach 30-40 per cent within 5 years' time, and over 50 per cent in 10 years.

The significance of this is that this trend could be taken up in other northern European countries (where wine consumption is also increasing), with the resultant effect that the sheer volume of wine under plastic/metal makes it far more economical for the bottling industry to use it in other countries, including more traditional markets. This cumulative effect will clearly accelerate the overall drop in natural cork market share.

There is little doubt that the synthetics market is booming, and that producers are buoyant about the future. Supremecorq believes it will eventually be able to plug 'half of all but the most expensive wines' - which is the equivalent of approximately 40 per cent of the market. Plastic cork manufacturers are currently targeting the 'middle price bracket' (described as being 'up to £9') wine market with their products. This is currently the bracket experiencing the fastest growth, and where 'New World' wines are making the greatest impact. Some manufacturers predict that they will be able to squeeze cork out of this market altogether, leaving the 'bottom end' as well as some high-end wines for the cork sector.

However, there has been a move recently to put even some high-end reserve wines under new types of stopper. For example, the launch this year of a $135 bottle of reserve Cabernet Sauvignon came with a metal screw-top. A version of the same wine sold with a traditional cork stopper was put on sale for $10 less. The massive expansion in the synthetic sector is such that it has led to law-suits in the US for alleged infringement of patent and trademark. This may be a good indicator of the profit potential of the market, currently estimated at £500-800 million and growing.

In another clear indication of the shifts currently taking place, two of the world's leading producers of natural corks have also begun to supply synthetic corks to Bottlers and wineries. This would suggest a lack of confidence in future demand for natural cork from the very industry that supplies it. Cork Supply (a multinational cork group which is also America's largest supplier of natural cork) says that it is 'responding to the market.' Ironically, it is the cork industry which is best placed to supply the wine industry with synthetic stoppers because of its intimate knowledge of the industry. The temptation simply to switch materials will be a growing one if current trends continue.

The synthetic cork sector is continuing to invest large sums in R&D in order to produce increasingly sophisticated products. One plastic cork due to go on the market next year is the Betacorque, a British-made 'virtual cork' whose manufacturers claim is virtually indistinguishable from its natural counterpart. According to David Taylor, the company's director: 'Effectively it is like cork. If you cut it through the middle, the cell structure is virtually identical. The outside of the stopper also has the same texture and grains of a natural cork. People won't even know that they're pulling out a synthetic cork. Most of our corks will end up on British supermarket shelves. One of the chains has told us that if the trials go well, they will recommend to all their (wine) suppliers to use our product,' he added.[139]

Certainly the theoretical potential market for plastics is huge - an estimated 96 per cent of wine is in the 'quick consumption' bracket (i.e. within 2 years). Plus there are a number of emerging markets which -like 'New World wines' - have less of a cork-using tradition. These include expanded US wine ranges and the opening up of new markets in the Far East, such as China (where in fact wine has traditionally been stopped with plastic caps).

Up until recently, it has been cheaper for wineries to use traditional corks than synthetic versions. However, in recent years the overall trend has been one of increasing sales prices for cork, whilst the trend for plastic has been downwards. With increasing competition from within the synthetic stoppers market, this trend is likely to continue, thus eroding the marginal advantage currently enjoyed by cork and potentially accelerating its loss of market share.

At the moment many traditional European wineries, especially in France, are resisting the switch to plastic. However, as they face increasing competition from New World wines who are increasingly using coloured plastic stoppers as part of their marketing strategy, they may feel forced to 'go with the flow'. The recent opening of a number of distributors for plastic corks in Europe in the last two years is one indication that this may now be starting to happen. Supremecorq's Brooke Hilton says that 'our business is definitely increasing', and that that the biggest new growth markets are now 'in Europe'.

The use of synthetics as part of the wine's 'marketing package' was recently evidenced in a series of advertisements in the British press for an upmarket Chardonnay produced in South Africa. Replete with its aesthetic label, and described as 'the "first wine" of South Africa', the text includes a strapline at the bottom which reads: 'sealed with SUPREMECORQ - keeping fine wine fine'.

The plastic cork manufacturers have themselves emphasised the marketing value of their products. This follows the trend by supermarkets and New World wine producers alike who are experimenting with different-shaped bottles, new eye-catching designs, and other marketing innovations. Supremecorq was among the first to push a range of different coloured stoppers - including custom colours - to match or contrast wines.

Integra is another which 'comes in a broad range of colours that complement a variety of packaging designs'. Together with the use of new special dyes and inks, 'this will enable us to decorate Integra closures to designer's and customer requirements in multi-colours.'[140]

At some American wineries, a journalist noted, 'the plastic cork has become a selling point in itself. Customers can take their pick from blue, purple, tangerine, forest green and yellow stoppers as well as a pure white which resembles a plug of ice.'[141]

One reason for this is that, although the volume and numbers of wine brands are increasing, the range of grape castes is actually narrowing. Hence marketing - including the packaging - is an important factor in getting consumers to choose between what are essentially different brands of the same wine.

Wine has also traditionally been seen as the 'stuffy' drink of the middle-aged and middle-class, and so there are new competitive pressures to reach across the class and age groups and create new market outlets to absorb increasing output. 'Wine just isn't part of our traditions,' lamented an American wine journalist. 'Americans are intimidated by the cork.'[142]

'The intimidating nature of traditional wine packaging, which requires a special implement to gain access to the beverage, has long been a factor in the American wine industry's failure to attract more Americans to premium wine', concurs a US winery spokesman.[143]

Hence, the re-branding of wine is part of the strategy of reaching out to new, younger age groups. 'Apart from young stockbrokers celebrating their yearly bonuses, it's the over-50 crowd that drinks most of the wine', writes a wine trade commentator. 'California's winemakers are on the brink of a huge expansion, with thousands of acres of new vineyards coming into production over the next decade. To attract the younger crowd, the industry is investing some $10 million a year in an advertising campaign to loosen up wine's stuffy image. Gone are the references to the ancient hills of Tuscany and the ageing cellars of Bordeaux'.[144]

In their place has come the plastic cork. 'As trendy as the wine-packaging business can be with its rapid shifts in bottle styles, labels and other decoration, someone in the Northwest is sure to grab onto the artificials for no better reason than the array of available colours. Randall Grahm at Bonny Doon Winery in California already has grabbed onto that idea. His Pacific Rim dry Riesling, with a label motif featuring islands and seafoods, comes with a bright coral-coloured plastic cork.'[145]Bonny Doon Winery is a customer of Supremecorq, and is featured on the latter's web-site as stating - in reference to natural cork - that 'bark is for dogs'.

'Every year millions of dollars are budgeted to build wine brands, yet there is a never-ending area of brands fiercely competing for shelf space. The larger wine brands pay top marketing dollars to be seen on that shelf, while the rest of the brands find alternative routes to exposure.'[146]

After the crash

The problem is, of course, that natural cork will find it hard to compete on these terms, and could thus be rapidly replaced. Conservationists and academics have now begun to speculate about the future. According to Helena Freitas, a professor at Coimbra University and president of the Liga para a Proteccao da Natureza, Portugal's oldest conservation group: 'If the present situation continues and we lose the cork component of this type of agriculture, then the future is uncertain. One outcome could be the polarisation of agricultural practices, moving from current extensive systems to intensive ones. Another could be land abandonment as a result of increasing marginalisation. Both outcomes would most likely threaten the biodiversity of those areas. The other issue we would have to face would be the increasing desertification of these semi-arid areas.'

She adds: 'the loss of the montado's economic value could represent another opportunity for big business interests linked to the leisure sector - for example golf courses, game parks and so on - as well as for new extenses of eucalyptus in the areas closer to the coast.'

She points out that Portugal's montados suffered a previous setback when intensive agriculture was thought to have more of a future than cork. The notorious 'Wheat Campaign' of the former dictator Antonio Salazar led to many woodlands being removed for new fields. Today, many of those areas are barren and suffer from serious erosion problems.[147]

If cork prices were to collapse, it is said, then the first visible effect would be the virtual ending of current regeneration and replanting efforts. This would lead to an overall decline in the forest area because of the need to constant replant 5 per cent of the area simply to maintain its size and vigour. In a second phase, grubbing up - legal or otherwise - would begin as farmers seek to turn their land to profitable uses. When eucalyptus prices were relatively higher than cork in the late 1980s, some cork oak forests were deliberately burnt, and then eucalyptus planted in their place. A similar pattern may be repeated.

It is also likely that a further large-scale exodus would occur at this point as more farmers and their families seek waged work elsewhere. One recent estimate put the population of the Alentejo in 10 years time at less than 50,000 - one-tenth the current figure. Abandonment would increase erosion, scrub invasion, and the degradation of wildlife habitats. It would increase the likelihood of land being sold to outside commercial interests, such as logging companies, which would have profound consequences for wildlife, through the removal of natural vegetation, greater disturbance, the fragmentation of habitat areas, and the constant threat of fire.

There would also be strong pressure either to revise the law or to allow a more generous interpretation of the exclusion clauses in national legislation preventing the removal of trees except 'in the national economic interest'. This would not require a radical revision of the wording currently in the laws. A more predictable path would be for the greater devolution of responsibility to local authorities to determine when removal of trees is justified.

According to wildlife expert Dr. Luis Palma: 'What keeps the cork forests in place is their economic value which comes principally from the use of the bark to make natural wine corks. If these are replaced by plastic corks, then the value of the forests will diminish and economic pressure will grow for those areas of forest to be replaced. It is hard to see anything that could replace cork that would be environmentally sustainable given the poor soils and harsh climatic conditions.'[148]

The pressure to replace the woodlands with less sustainable landscapes could come from many sources. On the one hand, it could come from local authorities desperate to see development within their districts in the face of mass depopulation. On the other hand it could come from powerful agribusiness interests who would want to utilise the large areas of cheap land now available, perhaps with irrigation from the new dams currently under construction, for maize cultivation for example. It could almost certainly also be expected to come from logging companies who have already made no secret of their desire to expand new plantations on what they term as 'marginal lands and non-productive activities'.

Such companies (including Portucel) are currently drawing up plans to increase the area under plantations by 60 per cent or more by planting two million new hectares, half of which on 'abandoned forest'. The Portuguese press are already warning of the consequences: 'Portugal will enter a new phase of expansion of monocultures, with foreseeable consequences: greater fire hazards, bigger risks of disease; less biological diversity (both plants and associated wildlife), less diversity in forestry use (less beekeeping, less grazing, less fruits of the forests..) and less landscape diversity.'[149]

As the montado/dehesa farming system has become progressively more marginal as a whole, it has become even more reliant on the wine cork. Without wine corks, and the bulk purchasing power they command, cork production would become an economically marginal activity, and there would be no requirement for vast swathes of oak forest covering the landscape.

It would suffice to have a limited number of smaller-scale cork oak stands to meet the continuing demand from the fisheries, aviation, shoemaking and building industries (which account, altogether, for a mere 20-30 per cent of the cork industry's customers in sales value). The same could be said if cork continues to be used in a relatively small section of alcoholic beverages market with high symbolic factor e.g.. port, champagne, certain fine wines or - conversely - cheap corks for cheap table wine from some 'Old World' western European countries.

Even if corks are now found 'not guilty' of being responsible for wine spoilage in the UK, synthetics are probably here to stay to at least some extent given the growth in the market and the existing vested

interests. The investments of figures such as Bill Gates, and also Gordon Getty (the oil family member and art collector, who has gambled on screwcaps for reserve Cabernet Sauvignon at his Plumpjack vineyard) add weight to the advance of plastic and metal stoppers.

With no end in sight to the growing growth of the market, and the massive areas of new vineyards expected to come into production in New World countries, wine will become even more competitive - not less so - and the use of branding and packaging in marketing strategies will play a major role in competing for market share.

The opening of new markets elsewhere throughout history has initially involved an offensive on 'tradition'. The tradition of pulling out a natural cork is itself coming under attack. Hence Supremecorq brands its product as 'the new tradition'.[150] To make plastic corks acceptable, it is necessary to make the idea of using bark cork an anachronism. As one journalist asked, 'tea is now usually drunk out of bags. Leaves and a strainer are strictly for traditionalist. Is there any reason why the plastic cork shouldn't become the 21st century equivalent of the tea bag: a simpler and more efficient method of packaging designed to suit the needs of a mass market?'[151]
While a factory can regulate prices by controlling production, cork as an agricultural product cannot and is therefore much more at the mercy of the market. When an agricultural product goes into surplus of supply relative to demand, the price falls, and if synthetic alternatives take an increasingly larger share of the market by virtue of the fact that they are growing in use faster than the number of bottles on the market is growing each year, then it is inevitable that a surplus of cork supply will emerge, causing a significant price drop.

And as Capoulas Santos, Portugal's Agriculture Minister commented recently: 'Farmers will only continue to practice the traditional system of montado farming so long as it is economically viable.'[152] If he is right, then - as one European trade promotion agency states - 'The days of the traditional wine cork made from the bark of the cork tree could well be numbered'.[153]

CONCLUSIONS

Britain's supermarkets have in recent years, and in clear deference to customer demand, strenuously promoted their 'green credentials'. This has included introducing organic produce, providing clear labelling of ingredients, and so on.

On its internet web-site, for example, Asda, has a page entitled 'Summary of Environmental Activity' in which it states: 'ASDA tries to encourage best practice from our suppliers as we feel partly responsible for the environmental impacts associated with the products and/or services that we buy'. It adds that it 'aims to protect the world's forests'.

Safeway, which proclaims itself to be 'The Green Grocer'[154], assures the public that 'as one of the UK's leading food retailers, we understand that we have a moral commitment to the environment in which we operate.'

Sainsbury's, meanwhile, says that it publishes 'a wide range of free customer information leaflets … identifying relevant environment performance'. Its sister Homebase DIY chain tells customers that wood-based products - including cork tiles - come from sustainable sources. As Dolores Hedo, a Spanish ornithologist, points out: 'Many retailers are already part of the Forest Stewardship Council, but for some reason do not choose to extend this labelling scheme to corks in bottles'.[155]

Similarly, Tesco is proud of its progressive labelling policy to inform customers about products, and extends this commitment to wine, but not - as yet - to the cork.

'Without cork oak trees, much of southern Portugal and Spain would already be a desert. It is no exaggeration to say that most parts of the Alentejo, and many parts of Andalucia and Extremadura, rely almost totally on cork. If the economic value of cork is threatened, so then are the forests themselves, and in turn some of the world's rarest wildlife is at stake. Consumers, meanwhile, are saying they want natural and environmentally friendly products.'

Armando Sevinate Pinto
(former EC Forestry Policy Director)

The 'Cork Mark' developed by the Food and Agriculture Organisation of the UN is a universal label registered and available throughout the EU and other countries of the world. Its adoption by all retailers would ensure consumers are provided with the same informed choice regardless of where they shop. The mark is also an internationally-recognised guarantor of quality and sustainability.

The move by British supermarkets and leading off-licence chains from a natural, organic product to a synthetic substitute without informing or having consulted customers appears to be in direct contradiction to their stated policies. The environmental value of natural cork is recognised by organic wine growers in the US, whose guidelines expressly prohibit the use of plastic corks and which insist on natural cork.

Supermarkets have claimed that their hand has been forced by a 'media cry', when in fact the 'cry' consists mainly of their own views being reported, rather than the opinions of independent scientists or technicians. The views of readers of the print media have consistently expressed their own cry of support for cork and a rejection of plastic. As one of the many letters published on the subject put it: 'How can anyone in this day and age be conned into believing that (cheap, profit-friendly) plastic is preferable to natural sustainable cork?'[156]

Surveys of public opinion have confirmed the public's view in this respect, a fact recognised by some supermarkets. The Clayton Reed survey showed 84 per cent of wine-drinkers preferred natural cork, even if there were a supposed risk of 'cork taint'. When asked whether customers were 'crying' for plastic

corks, a supermarket spokesman conceded: 'I accept they're not queuing up to demand plastic stoppers.'[157]

Although Britain's retailers have yet to respond to public opinion, there is evidence that some wineries are. Earlier this year, a leading American winemaker announced it was returning to natural cork following a survey it had conducted among its customers which showed that 75 per cent were more likely to buy the wine if it had a real cork.[158]

As awareness of the issue grows, public figures are beginning to make their views heard. Phillipa Forester, a wildlife expert and presenter of BBC TV's Tomorrow's World states: 'We are being told that we must live in a sustainable way to provide us with a healthy tomorrow's world, yet cork is a sustainable product which biodegrades, and which is being squeezed out of the marketplace by a stopper that's a by-product of the petrochemical industry. And who suffers? The local people and the wildlife.'[159]

The fact that the use of synthetic stoppers is much higher in British stores than the stoppers' average global market share only serves to highlight the apparent contradiction between the stores' claims regarding their 'green credentials' and the situation in relation to natural cork. There is yet another 'ethical dimension' - whereas natural cork production tends to distribute wealth evenly, synthetic cork manufacturers concentrate the wealth of the stopper market into relatively fewer hands.

Moreover, the supermarkets have been unable to show convincingly that plastic stoppers are necessary. As an official of one major store told the author, they have no scientific evidence whatsoever to show that they have had a single case of cork-induced TCA. In fact, the only independent scientific evidence which does exist in Britain shows that TCA from cork is a relatively marginal issue, a belief shared by many leading bottlers and winemakers in the UK. As the wine industry press has pointed out, it is likely to be rendered practically negligible in the face of recent technological innovations within the cork industry.

If, as some supermarkets have said, the issue all along was the need to improve cork quality, then it appears the cork industry has taken up the challenge and met it successfully. Those same supermarkets said they would return to using natural cork once this had been accomplished. It now remains to be seen whether they carry out their promise.

The fact that there has been no comparable 'cry' regarding cork's faults or concerning the need to switch to plastic in countries with much higher wine consumption rates, or with economically powerful wine industries, would, however, tend to suggest that cork has been wrong scapegoated in the first place. As Norman Baker MP, Consumer Affairs spokesperson for the Liberal Democrats (and himself a former off-licence manager) comments: 'Wine has been bottled up with natural cork for centuries. It is the feeblest possible excuse to pretend now there may be some problems with this.'[160]

'One of Europe's oldest forest ecosystems is under threat from globalisation. This is one of the few economic activities that takes place within nature that is good for it. The forests are a vital ecological resource for the whole of Europe, and tens of thousands of people rely directly on these trees.

'If we lose the cork industry component as the financial propeller for this type of agriculture, then the future is uncertain. The end result, though, is likely to be one of mass abandonment of the land and the transformation of an already semi-arid area into a desert.'

Dr. Helena Freitas
(President, Liga para a Proteccao da Natureza)

One of the major issues relating to wine quality which does exist may be connected to the retailers' changes in buying policy in recent years. The move to sourcing wine from further away requires

additional safeguards regarding the use of preservatives, timely bottling of the wine and storage. Without such safeguards, the threat of wine oxidisation can be problematic.

Supermarkets' arguments about the practice of cork stripping and other related environmental issues have not held up to informed scrutiny. Not one of their claims in this regard has been substantiated. Indeed, credible scientific opinion, as well as that of established conservation agencies, refutes these allegations in their entirety, and in fact raise precisely the same concerns previously expressed by the RSPB.

The replacement of some old-growth forests, and the subsequent destruction of wildlife habitats, has been linked directly to the loss of value of the produce of traditional agriculture systems, such as cereals and pork exports from the montados and dehesas. If the system were now to lose the value of cork also, many more woodlands will be abandoned or simply go, and with them will go their plantlife and wildlife. As previous trends have shown, the increase in alternative land uses is proportional to decreases in the price of cork.

The threat of extinction from habitat degradation is very real, as evidenced by the disappearance of the Pyrenean Ibex earlier this year, and the probable disappearance of the Imperial Eagle within Portugal. The need to preserve the montados and dehesas as a way of ensuring the continued presence of other endangered species is confirmed by the call from agencies ranging from Portugal's official nature conservation body (ICN) to the World Wide Fund for Nature's Mediterranean programme for the promotion of the produce of these sustainable farming systems, including cork, as a way of ensuring the preservation of the habitats of species including the Iberian Lynx, the Imperial Eagle and the Bonelli's Eagle.

The benefits of the montados and dehesas should not, however, be considered solely in national terms but also as European and international assets. As well as preserving a unique array of fauna and flora, they also play an important role in regulating Europe's climate at a time when the destructive extremes of global warming are clearly in evidence. As Dr. Ute Collier - an experienced climate scientist - has pointed out, if just the cork forests of Spain and Portugal were to be replaced over the space of a year, this would immediately add 10 per cent to the EU's carbon emissions.[161]

Conservation measures alone will not suffice to ensure the long-term future of these areas, as at least one retailer has privately argued. It is unrealistic to simply turn large inhabited parts of Europe into an empty nature reserve. Nor would this benefit wildlife, for whom the optimum habitats require the active intervention of farmers using traditional techniques to ensure the greatest biodiversity.

There is currently an urgent public debate on finding solutions to Europe's - and the world's - environmental problems, including pollution, erosion, sustainable food sources, controlling climate change, and species loss. The traditional farming systems of the montados and dehesas are a model of sustainability. To lose such a system at a time of growing environmental awareness, due to the substitution of a natural product with a synthetic one, would be an act of folly.

The economically marginal nature of these areas means that this is precisely what could happen. The montados and dehesas developed in harmony with nature over thousands of years. They could disappear in the next twenty to thirty. This is an avoidable tragedy.

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Annex 1

Endangered vegetation of the montado in Portugal

centaurea vicentina
drosphyllum lusitanicum
euphorbia paniculata subsp. monchiquensis
quercus canarirensis
rhododendrum ponticum subsp. baeticum
ruscus aculeatus
senecio lopezzi
thymus villosus subsp. Villosus

(from: 'Interaccoes entre floresta e ambiente nas serras do Algarve e sudoeste do Alentejo, L. Palma, Universidade do Algarve, Julho 1997)

Birds of prey in Portugal - species, numbers and trends

Honey buzzard: 100-150 probably stable
black-winged kite: 100-150 probably stable
black kite: 650-950: decreasing
red kite: 25-40 - strongly decreasing
Egyptian vulture: 105-123 slightly decreasing
griffon vulture: 415-422 increasing
cinerous vulture: 3 increasing
short-toed eagle: 250-300 stable
marsh harrier: 38-49 stable or slightly decreasing
hen harrier: 10-20 - locally decreasing
Montagu's harrier: 900-1200 decreasing
goshawk - 200-300 possibly decreasing
sparrowhawk - 500-1000 probably stable
common buzzard: 2000-4000 stable
golden eagle: 51-61 increasing
Imperial eagle: probably extinct
booted eagle: 250-350 stable
Bonelli's eagle: 77-79 slowly decreasing
osprey: nearly extinct
peregrine falcon: 55-90 increasing
hobby: 250-500: unknown
kestrel: 1000-1500 possibly decreasing
lesser kestrel: 155-165 marked decrease

from 'Revised distribution and status of diurnal birds of prey in Portugal', L. Palma et al, Avocetta no. 23, (2): 3-18 (1999)

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