Background and initial investigation paper on the red tape challenge proposal to scrap The Watermark Disease (Local Authorities) Order 1974 (SI 1974 No. 768)

Summary

This proposal is part of the government's drive to reduce the regulatory burden or red tape[1] that surrounds businesses and is a cost to the taxpayer. The Watermark Disease Order is enforced by Local Authority Councils and therefore comes at a cost to taxpayers to maintain. Of the six Local Authorities where the Order is enforceable these powers have not been exercised in the last 5 years, in some instances even longer. The bacterium *Brenneria salicis* the cause of watermark disease in willow is prevalent in the wider environment; hence the removal of diseased trees is unlikely to eradicate the disease. The disease can remain symptomless in trees making transportation of cutting material the primary source of disease spread.

Background

Watermark disease has been present in Great Britain for a long time, it was first described in England in 1924 (Day 1924). In an attempt to control the disease The Watermark Disease (Local Authorities) Order (1974) came into effect in the local authorities of Bedfordshire, Essex, Hertfordshire, Norfolk, Suffolk and Wiltshire. The Order gives councils powers on being satisfied by a report from an appointed officer that the disease is present in any willows, or is present or has been present at any time during the previous three years in any sett-bed of willows, to serve a notice for the infected trees to be destroyed.

Watermark disease is prevalent in the cricket bat willow (*Salix alba var. caerulea*), a hybrid variety, the origin of which is unknown, that is almost always sterile and propagated vegetatively from sets cut from stool beds (Preece 1977). Cricket bat willows are grown principally for the production of cricket bats, with many hundreds of thousands of blades produced per annum from the wood. The wood of the cricket bat willow is light weight, white and recovers rather than fractures after repeated blows making it ideally suited to the production of cricket bats. The wood cells of infected trees undergo biochemical changes which weaken the wood resulting in it fracturing on impact, this along with the discolouration of the wood make infected trees useless for making cricket bats (Preece 1977).

Watermark disease is caused by the bacterium *Brenneria salicis* formerly known as *Erwinia salicis* which infects willow trees (Salix) causing leaves to wilt and turn a reddish colour. The disease is first visible on the tips of branches, in time spreading to the whole crown, often causing tree mortality (Preece 1977, Patrick 1991). The wood of infected trees is soaked in wood sap which discolours, upon air contact when the wood is cut, turning a reddish-brown to brownish-black colour contrasting with white healthy tissue. The stain of the wood may be present with or without the red leaf symptom (Preece 1977). The watermark disease symptoms rarely express themselves in trees less than 4 or 5 years old (Guven et al 1999). At any time a considerable number of infected but symptomless trees may exist in an infected area (Preece 1977).

Molecular (PCR) techniques have enabled detection of the disease within the tree sap at low concentrations (20 CFU/ml) of *B. salicis* bacteria (Hauben et al 1998, Guven et al 1999). This enables detection at an early age, long before physical symptoms display themselves, essential to minimise the spread of the disease. Research investigating the geographical distribution of *B. salicis* strains in Great Britain found that isolates of the disease were not clustered geographically, suggesting that the disease is spread through propagation methods from stool beds rather than directly from tree to tree (Guven et al 1999). In a similar study, *B. salicis* strains were genotyped from across NorthWest Europe (Belgium, The Netherlands and the United Kingdom) revealed very similar bacterial genomes indicating

that the spread of the disease is most likely from the movement of infected cuttings (Hauben et al. 1998). Once present on a site watermark disease may also spread between trees through leaf to leaf contact (Maes et al. 2009).

It is now largely accepted that the disease is primarily spread through transportation of plant material (cuttings) infected with *B. salicis*. Infected cuttings do not show any internal or external symptoms of watermark disease. Hauben et al. 1998 artificially applied *B. salicis* to the vascular fluid of 34 willow clones, a few years after they detected *B. salicis* cells in all 34 samples. However, only 13 of the 34 clones showed external and/or internal symptoms of the watermark disease at the time of sampling highlighting the importance of sampling plants present in stool beds used to provide reproductive material. It has been suggested that stool beds be registered and the sets produced from them as a means of identifying and eliminating infectious sources (Patrick 1990).

Research in the UK conducted by the University of East Anglia into the disease from 1989 was funded through a levy of 15p per 'cleft' of willow used to make a bat, but in the late 1990s the levy was dropped, and the research group disbanded. Recent research has concentrated on the presence of the disease in Belgium and the Netherlands in amenity varieties of willow. The bacterium has also been found to reside symptomless in other tree species besides willow such as poplar and alder (Maes et al. 2009). The presence of *B. salicis* is not always associated with disease development and it has been suggested that *B. salicis* exists as an endophyte (symbiont), indicating that disease development may not be dependent solely on infection (Maes et al. 2009).

Brenneria salicis growth seems to be dependent upon the sugars present in the tree sap (Huvenne et al. 2009). However, concentrations of *B. salicis* remain low in the summer months even in infected willow trees. This is thought to be due to sap movement caused by transpiration preventing high concentrations of bacterium to build up as they are constantly flushed through the tree. Unlike poplar and aspen, willow trees maintain high nutrient sap concentrations even after leaf senescence (Sauter 2000). This allows high concentrations of *B. salicis* to build up in the immobilised wood sap leading to long lasting contact with the xylem cell wall resulting in cellulose degradation and disease expression (Huvenne et al. 2009).

The non-pathogenic lifestyle characteristics of *B. salicis* in certain hosts and under certain environmental conditions suggest a wider distribution within the environment making control of watermark disease difficult (Huvenne et al. 2009). Where the disease is already present selection of planting material free of *B. salicis* will likely be of little benefit. Evidence suggests that *B. salicis* may turn parasitic under certain environmental conditions such as under nutrient imbalance caused by nitrogen excess (De Vos et al. 2007) and that control of fertilisation may help to prevent disease development. Climate and climatic change are also suspected to influence *B. salicis* densities and survival in the wood during winter and interaction with the plant (Maes et al. 2009).

Results of informal contact with Local Authorities

Local Authorities that are listed in the Order were asked when they last exercised their powers to issue a notice to any owner of diseased willow to have them destroyed and if they did still exercise these powers roughly how many times a year?

Local Authority	Comment
Bedfordshire	They do not exercise these powers, the last mention of someone inspecting willow trees for watermark disease was 1995.

Essex	In the last 8 years they have only once been commissioned by the grower to enforce their powers as they were having difficulty enforcing felling without.
Hertfordshire	The Local Authority has no knowledge of implementing this legislation. Borough Councils were asked to respond: Stevenage Borough Council confirms no notices issued since 2007, Dacorum Borough Council has not exercised these powers in at least 25 years, Hillingdon Borough for a similar period and Welwyn Hatfield Borough Council has not issued a notice for at least the last 8 years.
Norfolk	They have not exercised these powers since at least 2002, they had a false alarm last year, but the trees turned out to not be infected with watermark disease.
Suffolk	They have not exercised these powers before
Wiltshire	The last inspection conducted was logged in 1999

Steve Scott, Forestry Commission East and East Midlands area director commented that he could not remember the last time that a council had issued the Forestry Commission with a report of any action taken by Local Authorities under the Order.

J S Wright & Sons Limited the largest cricket bat producer supplying English cricket bat willow were asked if the industry now largely self regulates itself as transfer of the disease is now considered most likely from cuttings rather than infection from the wider environment?

They responded saying that they had become self-regulated as Essex County Council no longer employs anyone to conduct field visits and that there is no one with sufficient experience to pass knowledge on. They believe that '*there is no proof that Watermark Disease spreads through the propagation methods from the stool beds, rather than from tree to tree'.*

2005 informal consultation results

In a similar exercise in 2005 to determine the Orders continued relevance Local Authorities were asked if they thought the Order should remain in force or whether it should in any way be amended.

Local Authority	Comment
Bedfordshire	Inspections previously carried out by Essex CC until a few years ago. No outbreaks reported. Not aware of any enforcement action taking place
Essex	The council did not want to see the Order lost, but no evidence that they enforced it.
Hertfordshire	No knowledge of the legislative powers being used.
Norfolk	Not had to exercise the powers
Suffolk	No reply

Wiltshire	Added to the Order in 1992, the majority of diseased trees have been removed. The threat of legislative powers seems sufficient for landowners to do the job themselves.

References

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[1]Background to Red Tape Challenge

Website http://www.redtapechallenge.cabinetoffice.gov.uk/home/index/
Department for Environment, Food and Rural Affair - Red Tape Challenge
Agriculture Theme Proposals January 2014
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/275742/red-tape-challenge-agriculture-proposals.pdf