

Visit by FC England and Forest Research Staff to Germany to inspect the effects of Oak Processionary Moth (*Thaumetopoea processionea*)

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Introduction

Oak Processionary Moth can cause serious defoliation of oak trees, their principal host. On the Continent they have also been associated with hornbeam, hazel, beech, sweet chestnut and birch, but usually only where there is heavy infestation of nearby oak trees.

As with many moth species, population levels tend to vary from year to year, but they also show longer term cycles in which the population builds up to high densities over a period of 3-4 years and then declines again to lower density. Although a native of central and southern Europe, the moth spread northwards during the latter half of the twentieth century. It was first recorded in The Netherlands in 1991, and subsequent reports of damaged trees indicate that numbers soared, with 1995 - 1996 and 2004 - 2005 being particularly bad years for tree damage. Populations declined between those years, but are again reaching very damaging levels in The Netherlands and neighbouring areas of Belgium and in parts of Germany.

The caterpillars possess large numbers of small barbed hairs that contain an urticating toxin (thaumetopoein). These hairs are readily dislodged and can be blown in the wind and they cause serious irritation to the skin, eyes and bronchial tubes of humans and animals. They are considered a significant human health problem when populations reach outbreak proportions, such as those in The Netherlands and Belgium in recent years.

In 2006, Oak Processionary Moth was found in west London along a stretch of the A40 and in Kew and East Sheen. These were the first recorded breeding populations in Great

Britain. The moth has now spread to outer London and has also been recorded at a new outbreak in Berkshire.

It was felt that there was a need for further information on how this species was controlled and managed in Germany, where it is a significant problem.

22nd June - First Site Visit

The first visit of the day was to Brandenstein Estate, a private forest in the Saxony-Anhalt region of Germany. This is a 1500ha woodland producing timber material for pulp, plywood and laminate. It is mostly SP, NS and larch but there are considerable areas of lime, oak and red oak

Oak Processionary Moth had appeared as a significant problem in 2010 although there had been a serious outbreak in 1996/1997.

The first sites which we were taken to were significant in as much as they were young (20-25yr old) plantations and although not showing signs of too much defoliation, there were a considerable number of nests (and we were informed that this was at a higher intensity deeper into the woodland). The significance of this outbreak as far as the UK is concerned is that these were not openly grown oaks, but plantation crops which is not what we had been previously led to believe.

The public are allowed into these woodlands, but there is no doubt that the level of use is very low compared to British woodlands, so the public health hazard is minimal.

The State Forest Service organises and funds helicopter spraying of infested sites (if this is agreed by the owner). If it is recognised as a potential problem through ground surveys by woodland owners, the State will agree to spray. There was a degree of surprise that this might not be a feasible course of action in the UK - 'we spray everywhere - gardens, villages, churchyards - there is no objection, particularly in East Germany' !

Virtually all spraying is carried out using BT (*Bacillus thuringiensis*; = Dipel-DS), applied by helicopter at the end of April or beginning of May. This is achieved with some accuracy using GPS co-ordination. Control relies on stable weather conditions and a complete cover of the oak canopy (caterpillars will travel to the upper limits of the foliage and ingest the chemical from there)



Site 1 20-25 year old red oak plantation at Bernstein and Oak Processionary Moth nest

Some interesting information was provided on the health problem. Firstly, all workers who have been involved in management of these woodlands had suffered from 'rash' problems. Also, even 6 years after the previous outbreak had passed, the workers were still having difficulties and this was not just in the woodlands. A Forester who had been handling 6 year old cut logs had to be taken to hospital. As far as we could discover, there was no specific protective clothing provided for workers, just the advice to be aware of 'nests' when felling trees.

It was noted that although oak is the preferred host species of the caterpillar, they have been seen on beech and orchard (apple) trees as well.

Management Implications:

a) This has the potential of not just being a problem of openly grown mature oaks, but also in younger plantation crops.

b) The caterpillar nests were at extremely low levels (ground level upwards) and at a height which would interfere with any chainsaw activity.

c) Whilst this year's nests are very obvious, previous years may be less so as they fade in colour - close inspection is always needed to ensure that there is no danger.

d) It is difficult to see how spraying of similar plantations could be achieved in UK without the use of helicopters.

e) The longevity of the hairs and related health problems could be a serious issue - not just for forest workers but also for any indirect handling of logs or cut material.

Research Implications:

a) Standardised survey protocols could help to identify infested plantations and the level of risk.

b) Improving the efficiency of OPM pheromone traps (currently rather poor) and establishing relationships between trap catch and population density would provide a more cost effective method of assessing infestation.

c) There is very little information on natural biological control of OPM (parasites, predators, pathogens) and how this might limit populations in plantations or could be enhanced as a management tool.

Second Site Visit

This was on the same estate and was to a stand of 120 year old oak which had been attacked by the moth in 1996 - 1998. There had been no control carried out and many of the trees were standing dead (although a considerable number had been removed). Death had occurred due to complete defoliation leading to weakening and subsequent attack by *Agrilus biguttatus* (the Oak Jewel Beetle).

We were also shown a stand of P1960 Red Oak, attacked in 1996 - 75% of this site had been removed because of similar defoliation.

Similarly, a site of 150 year old oak which probably was affected by OPM about 5-6 years ago was completely defoliated and/or dead. The State service had offered to spray this area in 2010, but this was refused by the local forester who had decided to fell instead.

All these sites showed considerable numbers of nests - old and new - at a variety of heights on trunk and branches.

Management Implications:

a) OPM is obviously a serious defoliator and with no control there is no doubt that this will be the end result. This will weaken the trees and if it doesn't kill them directly, it will open them up to attack from other wood borers and possibly root pathogens, which will damage and kill.

b) Caterpillar populations can reach significant levels in these sites and, certainly in UK, these mature oak plantations are likely to be areas where there will be high public usage. This is potentially a very serious problem.

Research Implications:

a) The climatic conditions that favour a build-up in OPM populations in mature stands, the amount of defoliation needed to cause mortality, and the interaction between defoliation, wood-boring insects and pathogens under UK conditions are not known.

Third site Visit

This was a State Forest site at Klein-Wulkow, west of Brandenburg, where Oak Processionary Moth was discovered in 2003/2004 and sprayed with Dimilin (diflubenzuron) in 2007/2008. The significance of this site was that the moth's population was still extremely high and there was acute defoliation of the 120 -150 year old oaks. The reason cited as to why control had been unsuccessful was because spraying had not been carried out on the edge of the plantation due to the presence of a stream. The moth had rapidly re-infected from this location.

Costs were quoted for helicopter spraying - 238 Euro per hectare (average) and for vacuuming - 60 - 2000 Euro per tree.

OPM was also noted on hornbeam. There were a few other sites where we noted alternative species being used, but it was small scale and presumably where caterpillars had fallen from the upper canopy.



Site 3 Defoliated oaks along the edge of the stand, but trees within the stand were also defoliated or had been felled



Incidental feeding on beech

Management Implications:

a) Assuming helicopter spraying is not applicable in UK, then control options within closed woodland are extremely limited. Vacuuming is an option for individual trees in built-up areas and parks and gardens, but the cost implication and the unlikely event of achieving one hundred percent clearance in difficult site conditions, make vacuuming practically impossible in plantations.

b) The re-invasion from untreated sites appears to be considerable. Unless there is full removal of nests or control of the caterpillars, the treatment may ultimately be ineffective.

Research Implications:

a) If helicopter spraying is not an option in UK, then alternative methods for controlling OPM in plantations may need to be developed.

b) Information on dispersal distances and rates of re-invasion from untreated areas would help in the planning of control operations and estimating the likelihood of success.

Fourth Site Visit

This was to a privately run Wildlife Park at Weisserwarte which had an overstorey of mature (up to 200 year old) oak. Many of these had died and been felled but those remaining seemed in good health and fully foliated.

Oak Processionary Moth was first discovered on this site in 1999. Control by aerial spraying was carried out in 2001, but this did not stop the spread.

The Park was on the point of closing in 2010 because the health related problem had become so severe. We were informed that all the staff at the Park were subject to medication as a result of contact with the caterpillar hairs.

The area was sprayed again in 2010 and subsequently in 2011 using Dimilin and BT. There seems to be almost complete clearance of the problem - with much relief from the Park owners !

This is an expensive operation (at State expense In Germany) and will have to be repeated for many years to ensure that there is no repetition of the (human) health problem.



Site 4 The wildlife park at Weisserwarte

Management Implications:

a) Forestry Commission land in the SE is surrounded by many public and private recreational centres, many of which will have similar mature oaks as a valuable asset. The State cannot subsidise control, nor would it be possible, at present, to spray from the air. (Kew has been subject over the last few years to a similar problem, but has kept control of the outbreak by spraying from the ground, thanks to a budget of £30-50,000/annum. This is not sustainable in other locations throughout the South East.)

b) These areas will always be a point of re-infection.

Research Implications:

a) The development of cheaper and more effective ground-based spraying technology would benefit control in all situations, especially ultra-low volume techniques that deliver only the minimum amount of pesticide necessary.

Fifth Site Visit

We were taken to a series of State Service oak plantations near Weisserwarte which were approximately 80-100 years of age. These were sprayed in April 2011, but unfortunately this wasn't too successful. The helicopter had sprayed very precisely on 30 metre strips,

using its GPS control system, and coverage appeared good. The reason for failure may have been down to different flushing times of the oaks or weather conditions that caused an uneven distribution.

Sixth Site Visit

This was a specific but interesting visit. We were shown a few individual oaks which were adjacent to a school (10 metres or less) and within the grass surrounds. The oaks were mature and had substantial pupal nests which were at ground level. The school had been unable to open the windows because of the problem, although we were not informed of any health problems to the pupils.

A decision had been made to burn off the nests. This had been done, but apparently there had been no vacuuming prior to the burning. An examination of the ground around the trees showed that masses of nest material full of hairs were still present.

Management Implications:

a) There will be a need to provide the most effective control measures to areas of such a sensitive public nature.

b) In all cases where there needs to be nest removal, it is absolutely recommended that vacuuming is carried out first to ensure complete removal of all material.

Research Implications:

a) Information on distances that hairs can disperse from infested trees and their longevity in the environment would help quantify the (health) risk to adjacent properties.

b) What are the best means of communicating the health risks from OPM without causing undue panic?



Site 5 Defoliated and dying oaks in the State plantations near Weisserwarte
Summary

- This was a valuable visit covering a wide range of sites and conditions - private and public. There are many differences in management techniques which would not be applicable in the UK - most notably, the wide use of helicopter spraying and the willingness of the **State Service** to subsidise all control operations.
- We had previously had reports that areas of woodlands were being closed off to the public. This was not the case in the areas which we visited although when the question was asked it was stated that it may have been the case in other geographical areas and in area of high public usage
- The level of public access is considerably lower in the areas visited than would be the case in virtually all woodlands in SE England. Indications seem to suggest that where there is close proximity of people and infected oaks, health problems can arise - e.g. the Wildlife Park and the school. This is potentially a very serious issue.
- Infection by OPM seems possible in virtually any oak stand, young or old, openly grown or in plantations. This is more widespread than we had anticipated.

- Re-infection can arise very quickly if control is not carried out. Control in plantation oaks will be extremely difficult and expensive and the chances of 100% elimination in these sites almost impossible.
- Death by defoliation (or related indirect causes) is a probable outcome of infestation without control - this could be an issue where oaks are a major part of the landscape.
- The damaging hairs seem to remain in the environment for long periods of time (certainly not less than 6 years). This will have implications for both forest workers and subsequent handlers of cut wood.

Final Thoughts

- 1. This has all the potential to be a very serious pest in England, and we should be preparing ourselves for its expansion and possible serious consequences.**
- 2. We should consider a meeting of all parties in the very near future to discuss OPM - perhaps a meeting in two halves, concentrating on the health issues as well as the forest implications.**
- 3. There should be a review of the practical control measures necessary.**
- 4. There needs to be a concerted effort to raise the profile of this pest - political involvement is required.**

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