



Arboriculture Research Note

60	2012	
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Issued by the Arboricultural Advisory & Information Service

OAK DEFOLIATION by T.G. Winter, Entomologist, Forest Commission

Summary

Oak leaf roller moth and Winter moth cause serious defoliation of oak trees in Britain. Their biology and effects on trees are reviewed.

Introduction

1. Every year there is some defoliation of oak trees by caterpillars but this phenomenon varies greatly in severity; sometimes quite large areas may be affected for several years in succession. Both Pedunculate and Sessile oak (*Quercus robur* and *Q.petraea*) are attacked but other oaks are less vulnerable. The damage happens soon after the trees have flushed and there can be complete defoliation by late May or early June in south-east England, a little later in the north and west.

The insects responsible

2. Very few of about two hundred species of lepidopterous larvae (moth caterpillars) that feed on oak cause serious defoliation. Those most frequently encountered are Oak leaf roller moth (*Tortrix viridana*) and Winter moth (*Operophtera brumata*). Both are common and widespread in Britain with *T.viridana* particularly abundant in south-east England.
3. *Tortrix viridana* – caterpillars hatch from the eggs and start feeding in the buds as they open. Later larvae, which are grey-green with black spots and a brown to blackish head, roll or fold over part of a leaf and line it with silk, to form a protective cover within which they feed and later pupate. Where populations are dense, crowding often forces caterpillars to descend on silk threads to leaves on lower branches. When defoliation is total some larvae may drop down onto other plants below the oaks and may even feed there before pupating in a folded leaf.
4. The adult moths have distinctive green forewings (span 17-24mm) and pale grey hindwings. They fly from late June to mid-July, earlier in advanced seasons, and although mainly nocturnal are easily disturbed from the foliage during the day. The females lay their eggs, camouflaged with green wing scales, on twigs high in the tree crowns where they remain from July until the tree flushes in the spring.
5. *Operophtera brumata* – caterpillars are green with a darker dorsal stripe and two white and one yellow line on either side. They have a brownish head and are about 15mm long when full grown. *O.brumata* belongs to the family Geometridae whose members walk with a characteristic looping action due to their having only one pair each of hind legs and claspers (most Lepidoptera have four pairs plus claspers). The caterpillars eat the expanding leaves in the spring and spin several leaves loosely together to conceal themselves when not feeding. They are fully grown by late May or early June, rather later in northern Britain, when they descend to the ground and pupate in the soil. Adult moths emerge in October and November and the males (wingspan 28-33mm) fly until

early January. The females have vestigial wings only (apterous) and crawl up the trunks to lay their eggs near buds on both oaks and many other trees and shrubs.

The damage caused.

6. Both *Tortrix viridana* and *Operophtera brumata* can cause complete defoliation and may also reduce the increment of summer wood. This may recur for several years before caterpillar numbers decline due to the action of insect parasites, predators and diseases. Individual mature trees that have been defoliated on many occasions in the past have suffered no permanent damage. Normally trees are not killed by these insects and despite the bare wintry look of defoliated oaks in early summer they will flush again in June and regain a green canopy. During the past few years, however, at several sites in southern England, crown die-back has been associated with defoliation by *T.viridana*. In extreme cases trees have died but the cause of death and the part played by *T.viridana* is not known.
7. On young trees that are not yet established insecticidal protection may be advisable, especially where they are planted below mature oaks supporting a high population of *T. viridana* or *O.brumata* caterpillars. For details of chemicals, contact the Tree helpline: 09065 161147 (calls are charged at £1-50 per minute). Treatment of larger trees is impractical and not necessary.

Published by:

June 1988

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Revised with minor alterations April 2012

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