THREE TROUBLESOME RESURGENT APPLE PESTS

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Apple trees can support a large diversity of insects and mites. Approximately 2000 species have been found in studies on unsprayed trees. About 50% of these can be classed as pests because they feed on the tree, though the damage caused by many in insignificant.

A further 25% are natural enemies of the pests and the remaining 25% are benign but may be important alternative food sources for the natural enemies. However, even occasional use of insecticides reduces the apple tree arthropod fauna and regularly sprayed trees have greatly reduced numbers of invertebrates. Insecticide used in apple orchards is primarily targeted against key pests such as rosy apple aphid, early season caterpillars and codling moth. When broad-spectrum insecticides are used, many minor pests are controlled or suppressed, many being virtually eliminated from the orchard. Their pest status depends on the timing, persistence and spectrum of activities of the insecticides applied.

Use of broad-spectrum organophosphate insecticides is declining in favour of selective or partially selective neonicotinoids, novel insecticides and insect growth regulators. Changes in pesticide use and other factors such as orchard management or climate are allowing certain species to resurge as significant pests. Here are three resurgent minor apple pests which are currently troublesome, (mussel scale, woolly aphid and flat scarlet mite), are discussed.

Mussel Scale

Mussel scale has been increasing in importance in many apple orchards in recent years. The pest was controlled very effectively by occasional use of tar oil winter washes, but these are no longer available. The main damage is caused by the presence of mussel scales on the surface of fruits at harvest. The contamination is superficial but may downgrade the fruit. Very heavy infestations on the bark may debilitate the tree and contaminate the foliage and fruit with honeydew.

Until recently, it was believed that a mass hatch of the eggs and emergence of young crawlers of mussel scale occurred in a short period of a few days in late May or June and that insecticide sprays needed to be precisely timed to coincide with this emergence to achieve good control. However, ongoing HDC-funded research by East Malling Research is showing that this is not the case. In 2007 and 2008, we monitored the emergence of crawlers using sticky band traps made from double sided sticky tape. The emergence started much earlier than expected and occurred over a period of at least 6 weeks in both years. In 2007, we showed that best control was achieved by a spray of thiacloprid (Calypso) at the end of the migration period. Early sprays are not persistent enough to catch the late emerging crawlers. Two sprays were necessary to get a high standard of control on the severely infested trial trees. In the second year's trial winter oil treatments and applications of different insecticide products at the end of the migration are being compared. At the time of writing, results are not available, but they should provide useful information to growers on the best control for this pest.

Woolly aphid

Woolly aphid infestations have also increased in many orchards in recent years. Regular application of chlorpyrifos pre and post blossom used to keep the pest in check, but use of this insecticide has declined.

The common earwig is an important natural enemy of woolly aphid. If earwigs are present in sufficient numbers, woolly aphid remains at low levels and is not a significant pest. Ongoing work in Belgium and the Netherlands has shown that earwig populations vary greatly between orchards. Some orchards have very low populations and consequently suffer from damaging woolly aphid infestations. The reasons for the variation are not clear. Part of the cause may be vulnerability of the young stages of insecticides. The effects of many modern insecticides on earwigs have not been thoroughly investigated. Laboratory tests indicate that certain insecticides generally regarded as safe to most predators may be harmful to earwigs. The main cause of the earwig population variation is thought to be natural mortality factors. High mortality can occur in winter due to soil water logging or soil disturbance. The centipede Lithobius forficatus is a voracious winter predator and can greatly reduce over wintering populations and variations in the abundance of this predator may partly explain the variation in earwig populations. Earwigs are also very vulnerable to high mortality at their last larval development (L4) stage before pupation when they are highly cannibalistic, especially when there are insufficient refuges for them during the day. Understanding how to improve the earwig populations in orchards where their numbers are inadequate will help solve the woolly aphid problem.

A number of different insecticides will control woolly aphid including chlopyrifos, pirimicarb (Aphox etc.), flonicamid (Teppeki, Mainman), and thiamethoxam (Centric). Primicarb and flonicamid are preferable because they are more selective. Providing artificial refuges for earwigs may help to reduce cannibalism. However, for significant effects it may be necessary to provide refuges on every tree.

Flat scarlet mite

The flat scarlet mite (Cenopalpus pulcher) has long been known as a minor pest of apples in the UK. It was troublesome in the 1950s and 1960s. Populations have been increasing in apple orchards in recent years and in 2006 very damaging populations developed in a number of orchards in Eastern, South Eastern and Western growing areas in the UK. The mite overwinters as fertilised females on the bark of apple trees. Mites invade the foliage and flower/fruit clusters in May. Large numbers of mites feeding on foliage and developing fruits have a severe adverse effect on tree health and fruit quality. Leaves develop necrotic areas at the base and shrivel and drop prematurely if infestation is severe. Mites feeding around the eye of Cox and other varieties cause severe russet. Flat scarlet mite used to be controlled with dicofol (Kelthane) and certain OPs but these are no longer available. Chlorpyrifos is ineffective. Growers have found that they can control the pest with early season sprays of the synthetic pyrethroid, lambda cyhalothrin (Hallmark). However, this is not an ideal treatment because synthetic pyrethroids are harmful to the orchard predatory mite, Typhlodromus pyri, and many other important natural enemies.

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