Pest in focus - Thrips

Thrips are known colloquially as "thunder-bugs" or "thunder-flies" because they appear in swarms during thundery weather. There are around 3,000 species spread throughout the world, with over 150 kinds being found in the UK. The most familiar species are cereal thrips (*Limnothrips cerealium* and *Limnothrips denticollis*) and onion thrips (*Thrips tabaci*), both being relatively large dark coloured species and hence easily seen with the naked eye. Western flower thrips (*Frankliniella occidentalis*) are major pests of protected crops e.g. cucumber, pepper and many herbs. They are smaller and lighter in colour than cereal or onion thrips. As well as feeding damage on leaves and fruit they can also be responsible for spreading the Tomato Spotted Wilt Virus, which affects tomatoes and other solanacae. The most damaging for us organic growers are the onion thrips and this article will concentrate on them.

Onion thrips attack the leaves of allium crops and are more noticeable and serious on leeks, due to their cosmetic effect - reducing quality, marketable yield and necessitating extra trimming. They are probably the most serious pest problem in leek production in Northern Europe. Damage is characterised by white or silvery flecks on the leaves causing the plant to look unsightly. The thrips feed on the leaves, rupturing the surface cells so that they appear silvery-white from the reflection of air trapped inside the ruptured tissues. Leaves may later become distorted or blasted and can wither and die. The damage to the leaves can provide an entry point for plant pathogens while thrips themselves can carry plant pathogens on their mouth parts from one plant to another.

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Smaller, tan thrips on left is the onion thrips (Thrips tabaci). Larger yellowish thrips on the right is the western flower thrips (Frankliniella occidentalis).

Life cycle

Thrips have eggs, larvae, pre-pupae and winged adult life stages. The adult insects are 2mm long, slender and tapered with two pairs of wings. Onion thrips spend the winter in sheltered areas of plants, such as remnants of allium plants left in the field or on the crowns of lucerne and clover. In the spring winged adults emerge and search for suitable host plants. Their life cycle can be completed in 14 to 30 days, reduced to 10 or 11 days when temperatures are over 30°C. Eggs are laid singly in plant tissue and hatch in 5-10 days. Larvae then feed for several days on the youngest leaves at the top of the plant before becoming pre-pupae. The pupal stage follows in soil or leaf litter. The adults may live up to 20 days with one or two generations a year in the UK. Though alliums are the preferred host thrips,can be a problem in several other crops, such as cabbage, celery, tomatoes, beans, and cucumber and can be found on almost any crops and weeds.

The population dynamics in the UK are poorly understood. Work at Warwick HRI found that peak numbers of thrips were captured usually during July-August, whilst the numbers on plants often peaked in late August-September. They also concluded, in a Defra-funded report, that it is difficult to predict accurately the timing of peaks in numbers using accumulated day-degrees. Thrip populations can occasionally explode due to migration from nearby vegetation that is mowed, harvested, or is drying up.

Risk and monitoring

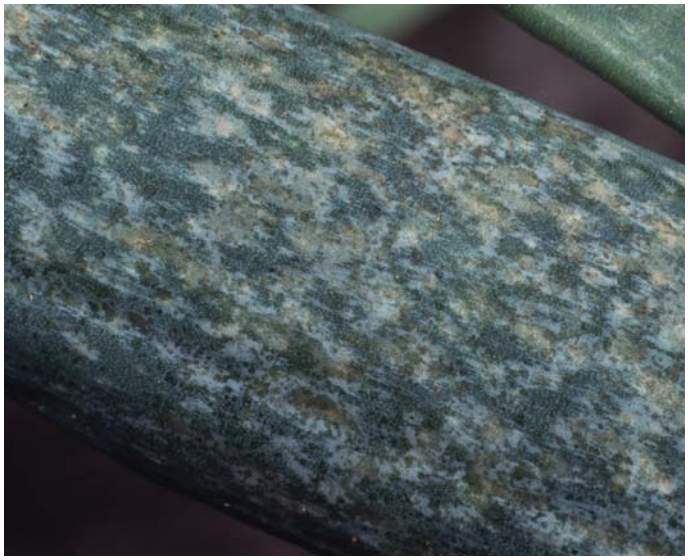
The presence of thrips is easily detected by visual inspection of the crop, although their damage is more easily seen than the insects themselves. Adults can also be monitored by the use of yellow or blue sticky traps. The presence on traps can't really be used to predict infestation numbers on plants but it can give an advance warning of impending colonisation.

The risk of losses is largely dependent on the time of intended harvest, with late summer and autumn harvested leeks most at risk. There is some evidence that leeks can outgrow damage after the peak of thrip feeding has passed and populations decline.

Management Strategies

Thrips over-winter in the soil and ploughing in crop debris can help control them, as can separating allium crops by space and time (rotation). They are not good flyers, but can move long distances on the wind. Younger plots should be planted upwind of older plots, relative to prevailing winds, to make it harder for the thrips to find the new plantings. Adequate irrigation throughout the growing season is important as drought stress can increase the susceptibility of onions to damage and because the pest thrives in hot dry conditions. High nitrogen levels may encourage them and it is possible that a lack of

adequate soil calcium gives rise to higher populations. The choice of cover crops can affect the number of over-wintering thrips, according to American literature. ATTRA recommends that susceptible crops should not be planted following wheat or rye, which provide them with excellent over-wintering sites.



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Close-up of thrips feeding damage on onion leaf

Crop covers can also be used, either fleece or fine mesh (0.17mm x 0.37mm mesh will exclude thrips), but as with other crops the covers need to be in place before the pest is present. Monitoring using traps can be useful here. If nothing else, it may be worthwhile covering leek transplants, to ensure clean seedlings prior to transplanting to the field.

Natural predators include ladybirds, hoverflies, predatory mites and spiders and these should be encouraged. Unfortunately thrips feed under close-fitting leaves and down in the leaf sheaths where they are difficult for predators to access. Naturally occurring fungal diseases can also devastate thrip populations. Under protected cropping conditions biological controls, such as the predatory mites *Amblyseius*, can be used.

The novel insecticide spinosad (Tracer), produced by fermentation of soil-borne actinomycete bacteria, is effective against thrips and is approved for use on leek crops. There may be a risk of insecticide resistance developing if Tracer is used intensively and exclusively. In order to get restricted practice permission from a certifying body details must be provided of why the product is needed and how the risks to key beneficial insects (such as bees) will be minimised.

Research

Thrips are colour-sensitive and there is inconclusive evidence that coloured (e.g. blue) mulches may be effective in their control. Researchers in Louisiana conducted a study to see whether aluminium-coated mulch would repel the pest. Black plastic was spray-painted in the field with aluminium paint. The reflective mulch repelled 33 to 68% of the thrips. If you can find a source of blue or reflective mulch it might be worth a try if mulching anyway for weed control. Intercropping could be a promising possibility for reducing populations in leeks. A research project found a significant decrease in the number of adult and larval populations of onion thrips developing on leeks when intercropped with clover, compared to leeks cultivated on their own.

A German research project in 2003 investigated the use of biological control in the field of *Thrips tabaci* on onions, leeks and chives on three sites, compared with a chemical control. They found that a fungi plus nematode treatment 'PreFeRal+Nemaplus' gave a significant reduction in both the number of thrips per plant and the frequency of infestation in onions. In leeks the fungi+nematode combination was also effective, with the treatments 'Nemaplus' and 'Mycotal+Nemaplus' producing 20% higher yields than the control. Researchers at Warwick HRI applied foliar sprays containing nematodes (*Steinernema feltiae*) to small plots of leek at 100,000 nematodes per m2 but found that it did not reduce the numbers of adult thrips or larvae.

Breeding for thrip resistance

Research at the Swiss Federal Research Station has indicated that breeding for thrip resistance in leeks is possible. There has been some research to show that tolerance to their feeding, rather than resistance to actual infestation, can be an important resistance mechanism involved in reducing damage to onion crops . A wide range in tolerance to feeding injury was demonstrated, independent of the population of thrips on plants. Plant architecture can also influence thrip population levels. In onions, cultivars with flat-sided leaves and a compact growth point (where the leaves are closely compressed) protect them from natural enemies, weather, and insecticides. Conversely - round, openly spaced leaves reduce thrips' hiding places.

Phil Sumption

Phil is currently working as part of the research team at Garden Organic on Organic Pest and Disease Management - A practical guide for Organic Farmers, Growers and Smallholders, which will be published by Crowood Books in the New Year

Photo: Garden Organic