

High Priority Organism: *Scirtothrips dorsalis* (Chilli thrips)



The chilli thrips is an invasive pest that feeds on the aerial parts of the plant, causing the growing parts to distort and discolour and in serious infestations to totally defoliate the plant. It is highly polyphagous (including kiwifruit) and with a limited ability to chemically control thrips in kiwifruit at their most damaging, Chilli thrips poses a serious threat to the industry.

Assessment of risk

Establishment in NZ	Economic impact	Market Access
Entry pathway	Host range (incl. kiwifruit)	Treatment required
Ease of establishment	Plant health	Area freedom required
Ease of detection	Crop productivity	Movement control
Ease of eradication	Crop protection	Quarantine requirements

Key: ■ High risk ■ Moderate/unknown risk (?) ■ Low risk

Description & Life cycle

The biology of *Scirtothrips dorsalis* (chilli thrips) is similar to that of other *Scirtothrips* spp.

Adults are about 1.2 mm long with dark wings and dark spots forming incomplete stripes, which appear on the abdomen. The abdomen has hardened plates that traverse the body. The shaded forewings are light in color with straight hairs.

Females insert eggs inside plant tissues above the soil surface. The eggs are microscopic (0.075 mm long and 0.070 mm wide), kidney shaped and creamy white in colour.

The eggs hatch between two to seven days, depending upon temperature. The two larval stages are completed in eight to ten days and the pupal stage lasts for 2-3 days.

Larvae and adults tend to gather near the mid-vein or borders of the host leaf. Unlike other thrips, pupae of chilli thrips are generally found on leaves, leaf litter or under the calyces of flowers and fruits.



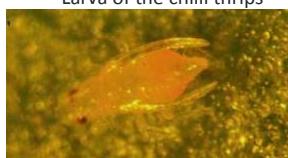
Adult male



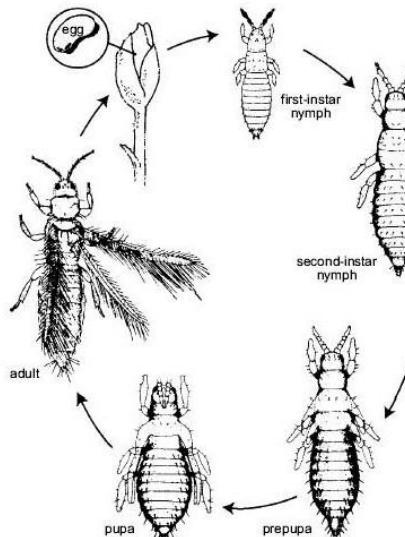
Adult female



Larva of the chilli thrips



Pupa of chilli thrips



Thrip Life cycle

The life span of Chilli thrips is influenced by the host plant species. For example, at 28°C it takes 11 days for a first instar larva to progress to the adult stage on pepper plants and 14 days on squash plants. The adult's life span lasts 16 days on eggplant, but only 14 days on tomato plants.

Distribution

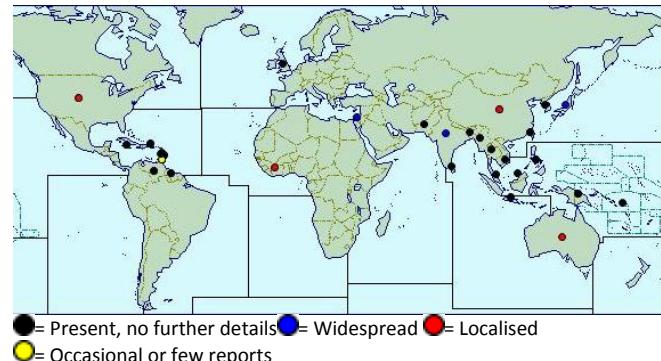
Scientists believe that Chilli thrips originated either in Southeast Asia or in the Indian subcontinent, but it is now widely distributed.

Chilli thrips are widespread between Pakistan, Japan, the Solomon Islands and Australia, but it is now established in South Africa, Israel, the Caribbean and Florida (USA). It is envisaged they could become particularly troublesome in the Southern and Pacific states of the US and become widespread in Central and South America.

Plant quarantine interceptions suggest that this pest is widely distributed across West Africa and is present in East Africa (Kenya). In the EU it is listed as present in the UK and found indoors only.

It is abundant on sacred lotus in Thailand, and on chilli peppers in India, where it is also a serious pest of peanuts. In Japan, it is a pest of tea and citrus.

In the United States, USDA-APHIS inspectors at various ports-of-entry intercepted *S. dorsalis* 89 times between 1984-2004 on imported plant materials and most frequently on cut flowers, fruits and vegetables.



Host & Climatic Range

Chilli thrips are highly polyphagous and attack over 100 plant species in 40 families. The commercially significant list of crops it attacks is long and includes chilli peppers, tea, strawberries, tomatoes, onions, grapevines, passionfruit, asparagus, citrus,

soyabean as well as kiwifruit. Ornamentals in Florida have been particularly hard hit. The original wild host plants were probably Acacia species.

It must be considered a serious quarantine risk in many other countries, including those in southern Europe and the Americas on field and tree crops and in the cooler areas of both Europe and North America on greenhouse crops. The current climatic range would suggest New Zealand would be similarly impacted.

Impacts

Thrips possess piercing and sucking mouthparts and cause damage by extracting the contents of individual epidermal cells leading to necrosis of tissue. This changes the tissue color from silvery to brown or black.

All of *S. dorsalis* life stages occur on all the above-ground plant parts of its hosts, and cause scarring damage due to feeding or the transmission of pathogens.

Chilli thrip create damaging feeding scars, distortions of leaves, and discolorations of buds, flowers and young fruits. Adult and nymphs suck the cell sap of leaves, causing rolling of the leaf upward and leaf size reduction. A severe infestation of Chilli thrips makes the tender leaves and buds brittle, resulting in complete defoliation and total crop loss.

On many hosts, after a heavy infestation Chilli thrips also start feeding on the upper surface of leaves. Chilli thrip has not been reported feeding on mature host tissues.

Chilli thrips have also been associated with the vectoring of seven recorded viruses. This species transmits chilli leaf curl (CLC) virus, and peanut necrosis virus (PBNV). Recently(2008), in Thailand its role as a vector of three tospoviruses (i.e., melon yellow spot virus (MYSV), watermelon silver mottle virus (WsMoV), and capsicum chlorosis virus (CaCV)) in field crops was confirmed.

It is also a suspected vector of tomato spotted wilt virus (TSWV) which causes bud necrosis in peanuts in India.

Control

Development of effective management practices for Chilli thrips is still in its infancy. Recommendations suggested include: crop rotation, removal of weeds, supporting the maximum use of natural enemies, including predators and parasites, and rotating insecticides.

Chemical control: Offshore, imidacloprid used as either soil drench or foliar application has provided effective control of Chilli thrips without harming natural control agents. Spinetoram gives the best result when used as a foliar application. Pyrethroids have never been reported to provide effective control.

In New Zealand, imidacloprid is normally used as a seed treatment for annual crops while spinetoram has recently been used in the control of the tomato potato phsyiid. The use of these chemicals in a kiwifruit context would require serious review before these products could be used safely and effectively. The current challenges of controlling thrips in kiwifruit where populations build in late summer (hence residue implications) would also confront Chilli thrips if they were to establish in New Zealand.

Biological control. Various biological control agents, including minute pirate bugs, *Orius* spp. (Hemiptera: Anthocoridae) and entomopathogenic nematodes, *Thripinema* spp. (Tylenchida: Allantonematidae), have been reported to effectively control field populations of the Chilli thrips. Adults of *Orius insidiosus* feed on all the life stages of thrips. Because *Orius insidiosus* also feeds on aphids, mites, moth eggs and pollen, its population does not decline strongly even if thrips populations are drastically reduced. *Thripinema* species are entomogenous nematodes, which parasitize female thrips and make them incapable of laying eggs, leading to the reduction of thrips populations.

Scirtothrips establishment information

Dispersal ability

Chilli thrips are dispersed via infested plant material – cut flowers, fruits and vegetables. Wind currents may also contribute in the dispersal of adult thrips.

The potential of Scirtothrips spp. for natural spread is relatively limited. Chilli thrips require access to soft green tissues so seedlings or cuttings with young growing leaf buds are most likely to carry these pests. Only young fruits are attacked, so the risk of these thrips being carried on harvested fruits is small. That being said there is increasing evidence of the worldwide spread of this pest.

Ease of detection

The small size (< 2 mm) of *S. dorsalis* life stages and rapid movement make it difficult to detect this insect in fresh vegetation. The very tiny eggs are inserted into soft plant tissues, and the egg stage may last one week. These characteristics increase the chance of transportation of *S. dorsalis* through international trade of fresh plant materials.

Unlike other thrips, pupae of chilli thrips are generally found on leaves, leaf litter or on the axils of leaves, in curled leaves or under the calyces of flowers and fruits.

Ease of Eradication

Insecticides would need to be applied to the foliage later in the season when fruit is exposed. The market access challenge would need to be addressed before in season control of Chilli thrips could be dealt to. As a result the reliance on biological methods would not be particularly helpful in an eradication strategy.



Feeding damage on peppers



Damage symptoms on mandarin fruits.