

# European tarnished plant bug on strawberries and other soft fruits

Jerry Cross, East Malling Research

**European tarnished plant bug is a damaging pest of mid- and late season strawberry crops and an occasional pest of raspberry and other cane fruits. The pest can cause damage at low population densities and control is only achieved by one or more sprays of insecticides many of which are broad-spectrum and therefore incompatible with predatory mites and insects that are used as biocontrol agents of other pests. This factsheet takes growers through the crop inspection and remedial action processes to monitor and control this pest in strawberry crops.**

## Background

The European tarnished plant bug (*Lygus rugulipennis*) (variously called ‘capsid’, ‘tarnished plant bug’ or ‘*Lygus*’) was first recognised as a pest of strawberry in the late 1980s coinciding with an increase in mid and late season strawberry

production and reduced use of broad spectrum insecticides in order to conserve *Phytoseiulus* predators. Fruit malformation, which was previously thought to be caused by poor pollination or thrips injury, was found to be associated with the pest and it was subsequently proved to be the causal agent.

The European tarnished plant bug is now considered an important pest of mid- and late season strawberry and an occasional pest of raspberry and other fruit crops in the UK.

## Pest identification

The adult European tarnished plant bug (Figure 1) has a typical capsid body form. It is 5-6mm in length and is highly active in warm conditions, making short flights if disturbed. The body is somewhat variable in colour but is usually light brown to yellowish green. There is a distinctive lighter coloured triangular area (the scutellum) in the middle of its back. The patterns of the markings in this triangular area are species specific and can help to distinguish species of very similar general appearance such as *Lygus rugulipennis* and *Lygus pratensis*.

A number of other capsid species also occur on strawberry but are usually less common or less numerous. The common green capsid (Figure 2) is much greener in colour and is seldom a pest of strawberry. Unlike the European tarnished plant bug, the common green capsid causes severe leaf damage and distortion to strawberry and raspberry. Other capsid species which occur on strawberry



1 Adult European tarnished plant bug



2 Common green capsid



3 *Calocoris norvegicus* (often called Strawberry bug or Potato capsid) is another potentially damaging species found on strawberry crops

include *Calocoris norvegicus* (a large green species) (Figure 3) and *Plagiognathus arbustorum* which is light red brown to almost black in colour. These capsid bugs should not be confused with predatory flower bugs such as anthocorids (Figure 4) or *Orius* (Figure 5) or mirids (Figure 6), which generally have a much smaller body size and are important predators in fruit crops.

The mouthparts of capsids are at the end of their rostrum, an elongated beak, which is folded back under the body until they feed.

Nymphs of European tarnished plant bug (Figure 7) are green and are smaller versions of the adult but the wings are only partially developed. They have distinctive pairs of black dots on the upper side of each of the front segments of the body.



4 Anthocorid bug



5 *Orius*, a predatory pirate bug

Photograph appears courtesy of BCP Ltd



6 A predatory mirid bug



7 European tarnished plant bug nymph

## Crop damage

The insect feeds principally in strawberry flowers and little, if any, damage to the foliage or stems seems to occur. It probes the surface of the receptacle especially round the tip, sucking the juices. Damaged parts of the flower then fail to develop whereas adjacent undamaged areas swell normally. Resultant fruit are malformed (Figure 8), 'buttoned', 'nubbined' or 'cat faced' with furrows and sunken areas. Similar malformation can occur from poor pollination, frost damage or pesticide application.

- **There is a 3–4 week interval between feeding damage occurring and malformed fruit being picked up by the grower. Damage may easily go unnoticed until picking.**

The pest causes significant damage even at low population densities. One individual may flit from one flower to another causing damage to many. Crop damage assessment trials have shown that **significant injury can be caused by as few as one individual per 40 plants.**



8 Fruit malformation caused by European tarnished plant bug feeding in flowers

---

## Life cycle

The European tarnished plant bug overwinters as an adult amongst leaf debris in hedge bottoms but possibly also around mature strawberry plants. The adults emerge on warm sunny days in March or April, usually in small numbers as winter mortality is high. Eggs are laid singly during May, being inserted into the stems of various plants. They hatch after a short time, depending on temperature, and the larvae feed in the flowers. They become adult at the end of July and

lay eggs giving rise to a late summer generation. The insect can be very abundant at this time and populations of 1–2 adults per plant have been seen in flowering everbearer strawberry crops. The second generation becomes adult in September and there is considerable pre-hibernation flight activity as the insect disperses to overwintering sites.

---

### Alternative host plants

In addition to strawberry, the European tarnished plant bug is a minor pest of raspberry and

blackberry. It can feed and breed on a very wide range of host plants. A wide range of weed species are common hosts including mayweeds (*Matricaria* sp), fathen (*Chenopodium album*), nightshades (*Solanum* sp.), groundsel (*Senecio vulgaris*) and many others. The insect can be abundant on such weeds, especially when the plant material is fresh and succulent and in the late summer and autumn.

---

## Crop monitoring

### Flowering strawberry crops should be examined carefully and regularly for this pest as part of the routine crop monitoring programme.

On warm, sunny days the insect is present in the flowers and is readily visible. If disturbed by a cast shadow or possibly noise it may fly away, usually only a metre or so. Adults and nymphs may also scuttle away and hide amongst foliage. Numbers of European tarnished plant bug and crop damage caused by it in a crop should be assessed in a systematic way along with other pests and diseases.

A good method is to:

- Walk across the crop in an irregular z shaped transect scouting across several rows for adults in flowers.

- Stop at 10 points (minimum) across the field, carefully examining the plants in a 2–3m radius around the stopping point for the presence of adults or nymphs in the flowers, or, if present, for malformation of developing and/or ripening fruits.

- At each stopping point, the foliage of at least one plant should be brushed or shaken with the hand to dislodge any adults or nymphs present which will fall onto the surrounding polythene mulch where they are easily spotted.

- The numbers of adults and nymphs should be counted and recorded.

The female produced sex pheromone of European tarnished plant bug, which attracts males, has recently

been identified by East Malling Research and the Natural Resources Institute, Chatham. The pheromone has three chemical components. A preliminary field experiment showed that males are attracted to lures releasing this pheromone at very low rates. Further work is needed to develop a practical and effective lure and pheromone trapping system that can be used for monitoring this pest in strawberry crops.

---

## Control

### Natural enemies

The European tarnished plant bug appears to have few important natural enemies in the UK. Most of its predators are bugs, beetles and lacewings that feed on a wide range of insects and do not specifically target the pest. A predatory nabid bug (*Nabis ferus*) has been shown to consume 2–3 third or fourth instar nymphs or up to 60 first instar nymphs of European tarnished plant bug per day in the laboratory. *Geocoris* predatory bugs are also occasional predators and predatory flower bugs (anthocorids) predate eggs occasionally.

Various species of parasitic wasp (parasitoids) are known to parasitise various life stages of plant bugs, including the European tarnished plant bug. Egg parasites from the families Mymaridae and Scelionidae have been shown to parasitise the eggs of closely related bugs in other countries. Parasitic wasps from the family Braconidae parasitise nymphs and parasitic flies from the family Tachinidae parasitise adults. In the UK, the braconid *Peristenus pallipes* has been recorded as a parasite of the European tarnished plant bug but parasitism rates are very low. In Poland, 32% parasitism by *Peristenus* has been recorded.

European tarnished plant bug has

been shown to be susceptible to fungal parasites in the laboratory including to *Verticillium lecanii* and *Beauveria bassiana*. The importance of fungal parasites in the field has not been investigated. However, in future it may be possible to exploit such fungal parasites for biocontrol, at least on protected crops where the high humidity conditions necessary for fungal spore germination can be maintained if required.

---

### Cultural control

Cultural measures to reduce the likelihood of infestation by this pest should be taken where possible.

Adults overwinter in leaf litter, sometimes amongst the old dead

leaves of strawberry plants. Removal of such leaf debris will help reduce numbers present in spring.

Cleanliness from weeds, not only in the crop itself, but in the vicinity, is important. Weed free conditions should be maintained throughout the growing period. Destroying mature weeds that harbour large numbers of the pest (particularly in July–September) may force the pest to invade adjacent strawberry crops.

Strawberry plants with dense, lush foliage are particularly favourable for adults and nymphs. Avoiding such growth will reduce infestations.

---

### Chemical control

Several insecticides approved for use on soft fruit crops are effective against capsids, including the European tarnished plant bug (Table 1, see overleaf), though none has a specific label recommendation for control of this pest. None of the products are ideal because they have harmful effects on biocontrol agents commonly used in soft fruit crops, including predatory mites *Phytoseiulus persimilis* and *Amblyseius cucumeris*.

*Bifenthrin* and *deltamethrin*: These synthetic pyrethroid insecticides are effective against the European tarnished plant bug but have long

persistent harmful effects against biocontrol agents including the predatory mites *Phytoseiulus persimilis* and *Amblyseius cucumeris*.

*Chlorpyrifos*: This moderately persistent organophosphorus insecticide is highly effective against European tarnished plant bug and is currently the product most frequently used for control of the pest. It has moderately long (6–8 weeks) harmful effects on the predatory mite *Amblyseius cucumeris* that is frequently used for biocontrol of tarsonemid mite and thrips in strawberry crops.

*Nicotine*: Of the insecticides approved for use on strawberries, only nicotine is specifically recommended for control of capsids. It is moderately effective, though seldom used because of its short persistence, toxicity to humans (including through skin contact) and the need to wear a respirator when applying sprays. It has short-term harmful effects to predatory mites.

*Pymetrozine*: This systemic insecticide is approved for control of aphids on ornamentals, protected cucumbers and potatoes and now has a SOLA [(Notice of Approval Numbers 1072/2003 (Chess WG) and 1073/2003 (Plenum WG)] for use in strawberry, cane fruit and currants. It acts mainly as an anti-feedant.

**Note** – Chess is only approved for use in protected crops and Plenum WG is only approved for use in outdoor crops. Work on other crops indicates that pymetrozine is effective against European tarnished plant bug though it has apparently not yet been tested for this purpose in strawberry. The 12 week harvest interval will often preclude its use in fruiting strawberry crops, a severe limitation as the European tarnished plant bug is most important in everbearer and late season strawberry crops. The main advantage of this product is that is comparatively safe to natural enemies and biocontrol agents.

*Thiacloprid*: This systemic nicotinyl insecticide is moderately effective against capsids including the European tarnished plant bug. A SOLA for use of Calypso on outdoor strawberries was issued on 23 June 2003 (Notice of Approval number 1399/2003). Calypso is moderately harmful to the predatory mites used as biocontrol agents and very harmful to *Orius* predatory bugs.

**Table 1 Insecticides approved for control of pests on strawberry and/or raspberry that are likely to also be effective for control of European tarnished plant bug and other capsid bugs.**

Choice of insecticides – Efficacy factors									
Active ingredient	Trade name (examples)	Class	Persistence	Approval (label recommendation)		Safety to biocontrol agents (persistence in weeks)			
				Crop	Pest	Phytoseiulus	Amblyseius	Orius	Steinernema
bifenthrin	Talstar	pyrethroid	long	Strawberry	Two-spotted spider mite	h, 8–12 wks	h, 8–12 wks	h, 8–12 wks	s
chlorpyrifos	Dursban etc	OP	long	Strawberry & raspberry	Aphids, caterpillars, raspberry beetle, cane midge, spider mites, blossom weevil (strawb), vine weevil (strawb)	mh, 0.5 wk	h, 6–8 wks	h, 5–6 wks	mh, 2 wks
deltamethrin	Decis	pyrethroid	long	Raspberry	Raspberry beetle	h, 8–12 wks	s	h, 8–12 wks	s
nicotine	XL All 95% nicotine	alkaloid	short	Strawberry & raspberry	Aphids, capsids, leafhoppers, sawflies	h, 1 wk	h, 1 wk	h, 1 wk	?
pymetrozine	Chess WG*, Plenum WG*	azomethine	moderate	SOLA on Strawberry & raspberry	SOLA: no label recommendations	sh	s	s	?
thiacloprid	Calypso	chloronicotyl	long	SOLA on outdoor strawberry	SOLA: no label recommendations	mh	?	vh	?
Choice of insecticides – Safety factors									
Hazards	Harvest interval (days)				Maximum number of sprays	Buffer zone width (m)			
	Anticholinesterase?	Fish & other aquatic life	Humans	Bees					
bifenthrin	no	ed	h, i	ed	0	2 per year	18		
chlorpyrifos	yes	ed	h, i	d	14	3 per year	18		
deltamethrin	no	ed	h, i	d	u	u	18		
nicotine	no	d	t	h	2	u	u		
pymetrozine	no	h	u	hr	12 weeks	3 per crop	u		
thiacloprid	no	h	h	u	3	Maximum total dose 500ml product per year	30		

h = harmful, mh = moderately harmful, i = irritant, d = dangerous, ed = extremely dangerous, hr = high risk, u = uncategorised/unclassified/unspecified, sh = slightly harmful, s = safe, t = toxic, ? = data not available

\* Chess WG has a SOLA for use on protected crops only, Plenum WG has a SOLA for use on outdoor crops only



