

# Host plant range of vine weevil

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This factsheet provides information on the host plant preference of adult and larval vine weevil (*Otiorhynchus sulcatus*) to a range of tree, shrub, and herbaceous plant species.

## Action points

- Use this factsheet to select susceptible plant species as indicator plants for monitoring pest activity.
- Monitor crops on a regular basis for signs of vine weevil feeding damage.
- Where possible, group crops according to susceptibility to vine weevil as an aid to both monitoring and pest control.
- Where practical and economical, consider omitting media-incorporated insecticide from plant species that are rarely attacked.



1 Adult vine weevil on leaf surface

## Introduction and background

Vine weevil (*Otiorhynchus sulcatus*) is a widespread and serious pest of nursery stock in the UK and much of continental Europe. As adult weevils are nocturnal, an infestation may not be spotted in time to prevent damage to the crop. Adult vine weevil feeding damage takes the form of leaf edge notching, which may not be very obvious and so can be overlooked initially. As all vine weevils are female, each adult can lay fertile eggs on the surface of the growing media or soil. The eggs then hatch into cream coloured, legless larvae that feed voraciously on the roots of a



2 Vine weevil larvae

wide range of plants causing further plant damage and crop losses. For full details of the life cycle, biology and control of vine weevil, see HDC Factsheet 02/03 'Vine weevil control in hardy nursery stock'.

Vine weevils are known to feed on a wide range of ornamental plant species, and there has been much research undertaken in both the US and Europe relating to host plant preferences and larval development on different host plant species. Some plant species are attacked by both the adult weevils and the larvae, such as evergreen *Euonymus*, whilst other species, such as *Sedum*, are frequently damaged by larvae but the adults do not feed on them (meaning they are attractive plants for egg laying). Other plant species are not susceptible to the adults and are rarely damaged by larvae for example *Hebe*. Research is still to uncover what actually determines the specific preferences of the adult vine weevils when it comes to both feeding and egg laying.

The range of species and varieties of ornamental plants grown by nursery stock growers in the UK is extremely wide; the majority are container grown using a peat-based growing media which has proven an ideal environment for the development of vine weevil larvae. To ensure that control of vine weevil is effective, a controlled release insecticide is often incorporated into the growing media at potting which gives control of the larvae for one or two seasons. However, this 'insurance' treatment can become expensive when used as a routine across the whole business, and may not be required for all the plant species grown. Vine weevil populations on some nurseries can also be quite low as a direct result of using media-incorporated insecticides for many years, and so there could be scope for reducing this widespread routine use, thus saving money.

Before any rationalisation of media-incorporated insecticides can take place, information is needed about which plant species and varieties

are the most susceptible to vine weevil, so that insecticide usage can be targeted only at those plants known to be the most susceptible to vine weevil. The information would also provide a good indication of which plants to monitor most intensively for signs of infestation, or those which may require curative treatments such as the application of insect parasitic nematodes. In addition, such information would also be useful as a training aid for new nursery staff members.

A survey of nursery stock growers in the UK was carried out, so that their observations and experiences regarding the host plant preferences of vine weevil could be taken into consideration. In addition the scientific literature, from several researchers has also been summarised.

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## Grower survey

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A survey form was designed to gather information on the top selling tree, shrub and herbaceous species and to categorise each plant species according to their susceptibility to vine weevil larvae. Plant species were categorised as either 'highly susceptible', 'less susceptible', or 'rarely attacked' by vine weevil larvae. The form was sent out in April 2010 and a total of 21 responses were received. The results, summarised as plant species which are either highly susceptible or rarely attacked, are presented in Table 1.

The summary shows that only relatively few conifer and shrub species are highly susceptible to weevil larvae, the life stage which is the most economically damaging. It is interesting to note that most of the shrubs listed as being highly susceptible to larvae are also susceptible to the adult weevils, leading to leaf notching.

By contrast, of the herbaceous species identified as highly susceptible to larvae, only *Bergenia*, *Convallaria*, *Epimedium* and *Primula* are susceptible to adult weevils, the remaining species, although clearly attractive to adult weevils for egg laying, are not fed on by the adults. It should also be noted that the short production cycle of many herbaceous plants means that the crop may be sold before a vine weevil population can become established.



3. Adult leaf notching feeding marks on *Photinia*



4. Adult leaf notching feeding marks on *Hosta*

Table 1 Susceptibility of plant species to vine weevil larval damage, based on grower experience

Conifers					
Highly susceptible			Rarely attacked		
<i>Cupressocyparis (leylandii)</i>		<i>Taxus*</i>			<i>Pinus</i>
<i>Junipers</i>		<i>Thuja</i>			
Shrubs and trees					
Highly susceptible			Rarely attacked		
<i>Azalea*</i>		<i>Photinia*</i>	<i>Amelanchier</i>	<i>Cytisus</i>	<i>Paeonia</i>
<i>Camellia*</i>		<i>Potentilla</i>	<i>Aucuba</i>	<i>Eleagnus</i>	<i>Philadelphus</i>
<i>Euonymus*</i>		<i>Prunus lusitanica*</i>	<i>Berberis</i>	<i>Escallonia</i>	<i>Pittosporum</i>
<i>Fuchsia*</i>		<i>Pyracantha*</i>	<i>Brachyglottis</i>	<i>Fagus</i>	<i>Prunus</i>
<i>Heathers*</i> (includes <i>Erica</i> , <i>Calluna</i> , <i>Daboecia</i> )		<i>Rhododendron*</i>	<i>Buddleia</i>	<i>Genista</i>	<i>laurocerasus**</i>
<i>Hydrangea*</i>		<i>Skimmia*</i>	<i>Buxus</i>	<i>Hebe</i>	<i>Ribes</i>
<i>Pieris*</i>		<i>Viburnum*</i>	<i>Ceanothus</i>	<i>Hypericum</i>	<i>Salvia</i>
			<i>Chaenomeles</i>	<i>Ilex</i>	<i>Sambucus</i>
			<i>Choisya</i>	<i>Lavender</i>	<i>Spiraea</i>
			<i>Cistus</i>	<i>Ligustrum</i>	<i>Symphoricarpos</i>
			<i>Cordyline</i>	<i>Lonicera</i>	<i>Vinca</i>
			<i>Cornus</i>	<i>Mahonia</i>	
			<i>Corylus</i>	<i>Olearia</i>	
Herbaceous					
Highly susceptible			Rarely attacked		
<i>Bergenia*</i>	<i>Geum</i>	<i>Primula*</i>	<i>Acanthus</i>	<i>Delphinium</i>	<i>Osteospermum</i>
<i>Convallaria*</i>	( <i>G. chilense</i> cultivars seem most affected)	<i>Rheum</i>	<i>Achillea</i>	<i>Echinacea</i>	<i>Penstemon</i>
<i>Cyclamen</i>	<i>Heuchera</i>	<i>Saxifrage</i>	<i>Ajuga</i>	<i>Eryngium</i>	<i>Persicaria</i>
<i>Epimedium*</i>	<i>Heucherella</i>	<i>Sedum</i>	<i>Alchemilla</i>	<i>Erysimum</i>	<i>Phlox</i>
<i>Ferns</i>	<i>Hosta</i>	<i>Sempervivum</i>	<i>Aquilegia</i>	<i>Helenium</i>	<i>Pulmonaria</i>
<i>Francoa</i>	<i>Iris</i>	<i>Tellima</i>	<i>Artemisia</i>	<i>Helianthemum</i>	<i>Rudbeckia</i>
<i>Geranium</i> ( <i>G. oxonianum</i> cultivars only; others seem unaffected)	<i>Lilium</i>	<i>Tiarella</i>	<i>Astrantia</i>	<i>Hemerocallis</i>	<i>Salvia</i>
			<i>Campanula</i>	<i>Leucanthemum</i>	<i>Verbascum</i>
			<i>Coreopsis</i>	<i>Liriope***</i>	<i>Veronica</i>
			<i>Crocsmia***</i>	<i>Lupin</i>	<i>Viola/Pansy</i>
			<i>Dahlia</i>	<i>Nepeta</i>	

\* Adult feeding also seen. \*\* May be confused with bacterial leaf spot. \*\*\* Monocotyledons rarely attacked.

## Literature survey

Table 2 is based on the conclusions of 10 key research studies that focused on vine weevil host range. However, care should be taken when interpreting these results, as larval feeding studies were typically completed by artificially infesting

plants with eggs or young larvae. Therefore, these studies do not fully reflect the preferences of adult vine weevils in their egg laying behaviour, and have led to differences in the classification of plant susceptibility.

Where there is a conflict between the results presented in Table 2 and the grower survey (Table 1), the entry is marked +. Where conflicts exist, susceptibilities referenced in Table 1 should be referred to.

## Weed hosts of vine weevil

A number of weed plant species are also susceptible to vine weevil including docks (*Rumex* spp.), plantains (*Plantago* spp.), rosebay willow herb (*Epilobium* spp.), dandelion (*Taraxacum* spp.) and knotweeds (*Polygonum*

spp.). These plants can act as food sources for either larval or adult vine weevil or both.

This list (derived from a combination of scientific literature, personal experience and industry comments) is

not exhaustive and there may well be other species which vine weevil can survive on. However, it points towards effective weed control being part of an overall vine weevil control strategy.

Table 2. Susceptibility of plant species to vine weevil larval damage, based on a summary of key research studies

Conifers					
Highly susceptible			Rarely attacked		
<i>Pinus*</i>	<i>Taxus</i>	<i>Thuja</i>			
Shrubs and trees					
Highly susceptible			Rarely attacked		
<i>Calluna</i>	<i>Kalmia</i>	<i>Pyracantha</i>		<i>Buxus</i>	
<i>Camellia</i>	<i>Laburnum</i>	<i>Rhododendron</i>		<i>Hebe</i>	
<i>Chaenomeles*</i>	<i>Malus</i>	<i>Ribes*</i>		<i>Nerium</i>	
<i>Cornus*</i>	<i>Parthenocissus</i>	<i>Rosa</i>			
<i>Cotoneaster</i>	<i>Photinia</i>	<i>Viburnum</i>			
<i>Erica</i>	<i>Potentilla</i>	<i>Vitis</i>			
<i>Euonymus</i>	<i>Pieris</i>	<i>Wisteria</i>			
<i>Fuchsia</i>	<i>Populus</i>				
<i>Hydrangea</i>	<i>Prunus</i>				
Herbaceous					
Highly susceptible			Rarely attacked		
<i>Achillea*</i>	<i>Dahlia*</i>	<i>Liriope*</i>		<i>Campanula</i>	
<i>Allium</i>	<i>Dianthus</i>	<i>Paeonia*</i>		<i>Euphorbia</i>	
<i>Artemisia*</i>	<i>Digitalis</i>	<i>Phlox*</i>			
<i>Aster</i>	<i>Epimedium</i>	<i>Polygonum</i>			
<i>Astilbe</i>	<i>Geranium*</i>	<i>Primula</i>			
<i>Begonia</i>	<i>Gladiolus</i>	<i>Rumex</i>			
<i>Bergenia</i>	<i>Heuchera</i>	<i>Saxifrage</i>			
<i>Campanula*</i>	<i>Heucherella</i>	<i>Sedum</i>			
<i>Chrysanthemum</i>	<i>Hosta</i>	<i>Sempervivium</i>			
<i>Convallaria</i>	<i>Iris</i>	<i>Verbena</i>			
<i>Cyclamen</i>	<i>Lilium</i>				

\* In the Grower survey (Table 1), these plants were not identified as highly susceptible, but were capable of supporting vine weevil larvae when eggs were inoculated onto them in scientific studies.



5. Adult leaf notching feeding marks on *Rumex* spp

## Cost comparisons of different approaches to vine weevil control

The cost of a media-incorporated insecticide is approximately 1.6p per litre of growing media, depending upon the exact product used and discounts available. Assuming a crop of 10,000 plants of a major single plant species such as *Prunus laurocerasus* is produced in 3 litre pots, with an approximate insecticide cost of 4.8p per pot, a saving of around £480 would be achievable if the insecticide was omitted from the growing media.

If this approach is taken, then intensive monitoring for leaf notching and the use of 'trap' plants would be needed, which would be extra production costs. Monitoring this number of plants would cost approximately 0.16p per pot per week, based on average labour costs (£8 per hour) and allowing 2

hours per week for crop inspection and maintenance of trap plants.

If a curative treatment is required, a nematode treatment (including labour costs) would cost approximately 2.3p per pot if applied by hand lance as a drench, or approximately 1.0p per pot if applied by boom sprayer, as this is less time consuming.

Therefore, if vine weevil levels on the nursery are low, a saving of around £480 per 10,000 plants is possible if the insecticide is omitted from the growing media. However, if weekly crop monitoring is taken into account the saving achieved is reduced, for example crop monitoring over a period of 3 months would reduce any savings to under £300. If a curative nematode treatment is also required this would reduce savings even further, especially if the treatment is applied by hand lance to the plants.

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## Conclusions

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Based on the results of the grower survey, there are actually only a limited number of shrub species that are very susceptible to vine weevil, whereas there are many more herbaceous species that can be badly damaged. However, when the results of the literature survey are combined with the grower survey, many more species of shrubs and herbaceous plants can be infested by vine weevil larvae, if other host plants are not available. The following points therefore need to be considered if a 'tailored' approach to the use of media-incorporated insecticides is adopted by the business:

- Highly susceptible subjects should be grouped together on the nursery, to make monitoring for infestation easier.
- The plant species grown should be reviewed and if a host plant is listed as rarely attacked, and vine weevil is at a very low level on the nursery, then it might be possible to omit the media-incorporated insecticide for that subject.

- If this approach is taken, then intensive monitoring for leaf notching (using 'trap' plants such as *Primula* and evergreen *Euonymus*) and grooved wood traps would be needed, together with a good knowledge of the life cycle of vine weevil (see HDC Factsheet 02/03 for further details of life cycle and biology of the pest).
- If adults or adult feeding damage is identified, then a targeted adult insecticide spray should be considered.
- Plants unprotected by a media-incorporated insecticide could be treated with a nematode drench in mid to late September to control vine weevil larvae and provide some level of protection, if necessary.

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## Acknowledgements

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