Diabrotica species

Why the concern?

Most cultivated plants are at risk of attack from *Diabrotica* species, and these beetles have the potential to become serious horticultural, as well as agricultural, pests in the UK. In addition, *Cucumber mosaic virus* and *Erwinia stewartii* (bacterial wilt of maize) can be spread by several *Diabrotica* species.

Diabrotica species are capable of spreading widely because the adults are strong fliers, reportedly able to travel 500 miles in 3–4 days. For example, in the 1990s the western corn rootworm was introduced into Serbia (Yugoslavia), and has subsequently spread into many parts of Europe. Research has shown that this pest is likely to survive and develop wherever maize is grown in Europe. *Diabrotica* species are distributed in various regions of the Americas. In the USA they are known as "billion dollar bugs" due to the economic importance of the damage they cause.

Several beetles of the genus *Diabrotica* are recognised in EC Plant Health legislation as quarantine pests. They are *Diabrotica barberi* (northern corn rootworm), *Diabrotica undecimpunctata howardi* (southern corn rootworm), *Diabrotica virgifera virgifera* (western corn rootworm), and *Diabrotica undecimpunctata undecimpunctata* (western spotted cucumber beetle). Other species that could also pose a threat to UK agricultural and horticultural crops include *Diabrotica significata* (3-spotted leaf beetle), *Diabrotica speciosa* (chrysanthemum beetle) and *Diabrotica balteata* (banded cucumber beetle).

Northern corn rootworm
Photograph courtesy of Stephan White, Kansas Department of Agriculture, USA.

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What crops are at risk?

Diabrotica species are capable of attacking most cultivated plants, however particularly severe crop losses occur in maize and cucurbits (cucumbers, melons, pumpkins, squashes, and gourds). Plants also at risk include wheat, barley, oats, rye, beans, peas, potato, oilseed rape, tomato, aubergine, lettuce, pepper, sunflower, and chrysanthemum.

Western corn rootworm larva feeding on maize roots
Photo courtesy of University of Illinois, USA (Department of Crop Science).

Northern corn rootworms feeding on maize ear
Photo courtesy of Marlin Rice, Iowa State University, USA.

What damage do they cause?

The larvae of those *Diabrotica* species known as corn rootworms feed on, and tunnel inside, the root system of their host plants. The damage caused reduces the amount of food available to the plant for growth, consequently lowering the yield.

Maize: In maize, symptoms of larval infestation of the roots usually become apparent when the plants are 20–50 cm tall. Plants grow poorly, become stunted and yellow, but may survive and produce grain. Lodging may be seen at more advanced growth stages. The ear weight of a lodged maize plant may be reduced by as much as 30%. In addition to boring into the roots, the southern corn rootworm enters the stalk just above the roots. Here it eats out the crown of young plants and kills the bud. In southern states of the USA, this species has shown that it can destroy 25% of a stand of maize when plants are 15 to 45 cm high.

Whilst the larvae mainly damage the roots, adults feed on every part of the plant above ground. In maize, their feeding on newly emerging silks prior to pollination is most serious, resulting in sparsely filled ears. Serial reduction in the number of ripening kernels from the tip of the ear to the base can often be observed at harvest. Whilst the adults do feed on young maize leaves, this is of secondary importance.

Cucurbits and other crops: *Diabrotica balteata* (the banded cucumber beetle) can be a major pest of cucurbits and root crops. The larvae feed on roots and tubers, resulting in reduced vigour, growth rate and fruit set. The market value of root crops can also be reduced, as the larvae produce large undesirable holes in the tubers.

The adults of this species are capable of causing serious damage to cucurbit seedlings by feeding on entire cotyledons. Infested cucurbits show adult feeding holes in the leaves and scars on the crown, stems, and young fruits. Even when feeding damage is not severe, mature plants can be destroyed as a result of disease transmission. The fruits can also be destroyed by adult boring damage, or through secondary invasion by various rotting agents.

What do they look like?

All corn rootworms have eggs, larvae, and pupae that are similar in appearance. The eggs are oval; 0.5 mm long pale yellow, and sculptured with hexagonal pits. The larvae are slender, white or pale yellow in colour, with a tan head capsule. They have three pairs of very short legs and grow to approximately 7 mm in length. The adults range in size from 4 to 7 mm in length depending on the sex of the beetle. The markings vary depending on the species, but all are elongate-oval in shape.

Southern corn rootworm, or spotted cucumber beetle
Photo courtesy of Stephan White, Kansas Department of Agriculture, USA.

Adult of the western corn rootworm
Photo courtesy of Marlin Rice, Iowa State University, USA.

Banded cucumber beetle
Photo courtesy of Bart Drees, Texas A&M University, USA.

Keep a good look out

As part of any commercial contract, seek assurance from your suppliers that plants are free from *Diabrotica* species.

Carefully inspect any new plants arriving at your holding and be aware that this pest group poses a risk to field crops as well as horticultural crops grown under protection.

If you suspect the presence of this pest you should immediately inform your local Defra Plant Health and Seeds Inspector (PHSI) or the PHSI HQ, York.

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