

## Review: Natural Enemies and Biocontrol of Pests of Strawberry in Northern and Central Europe

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*The natural enemies of the more important arthropod, nematode and mollusc pests of strawberry in northern and central Europe and their use as biocontrol agents are reviewed. Most pests of strawberry are polyphagous and they and their natural enemies occur on other host plants (especially Rosaceae) as well as on other crops. Strawberry cultivation methods, including protected cultivation and other methods of extending the fruiting season, soil sterilization, polythene mulching and pesticide spray programmes have profound influences on the pest and natural enemy complex, though such effects have not been quantified adequately. All the pests of strawberry reviewed have natural enemies, though some pests (e.g. capsid bugs) have few. A few natural enemy groups are known to act as important natural limiting factors in pest population development in commercial strawberry crops. Two examples are naturally-occurring phytoseiid predatory mites which regulate pest mite populations, and predatory carabid beetles which regulate root weevil populations. Apart from the introduction of predatory phytoseiid mites to control two-spotted spider mite, biocontrol is not widely used in commercial practice. Other biocontrol approaches are known to be efficacious, but are too costly in comparison with conventional insecticides for commercial adoption (e.g. nematodes for slug control). Several biocontrol approaches have been researched and have potential for further development and exploitation and there is considerable opportunity to develop new approaches. Research effort should concentrate on those for common pests, which are controlled currently by frequent sprays of broad-spectrum insecticides, e.g. aphids, blossom weevil, capsids and vine weevil. As strawberry is often grown as an annual or short-term perennial crop, exploiting natural populations of natural enemies is difficult. More effort needs to be devoted to the development of microbial and nematode biocontrol agents, which can be used as biopesticides. Protected cultivation of strawberry provides more favourable conditions for exploitation of biocontrol including introduction of insect predators and parasites.*

**Keywords:** *fruit, small fruit, soft fruit, strawberry, predator, parasite, parasitoid, natural enemy*

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