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Pest, disease and weed management in strawberry – progress and challenges for the Nordic production

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Black vine weevil and other wingless weevils: are there any effective control methods applicable in outdoor strawberry in Nordic countries?

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The black vine weevil (*Otiorhynchus sulcatus*) is a common pest in Central Europe but rather new on outdoor crops in Finland. First record of the weevil as pest was in a winter garden in the 1950's, since that it has occurred on a range of greenhouse and nursery crops, especially roses. The first record of black wine weevil in an outdoor strawberry field was reported in the late 1990's. The damage of the black vine weevil is due to larval feeding of roots. Black plastic mulch enhances feeding and reproduction of the black vine weevil in outdoor crops. As the weevils are wingless the spreading to new areas occurs mainly by transport of plant materials.

Two native species of strawberry root weevils, *Otiorhynchus ovatus* and *Othiorhynchus nodosus,* can be found all over the country. Although both species can be found in the same field, *O. ovatus* is more frequent in south and *O. nodosus* is more often found further north. Even *O. sulcatus* has survived over winter in Finland.

Chemical control of the wingless root weevils is difficult. Adult weevils are mainly night active and the root damaging larvae live in the ground, and chemical control does not reach the pest. Besides, the adult weevils are tolerant to many pesticides, and soil pesticides are not allowed. Cultural control is based on hygiene, rotation with substantial distances to new fields and shorter, 2-3 years cropping cycles. Biological control is possible by using entomopathogenic nematodes.

Spreading of enthomopathogenic nematodes against weevils by drip irrigation system was tested at MTT during 2003-2004. Two species of nematodes, *Heterorhabditis bacteriophora* and *Steinernema kraussei* were compared for their suitability in our climate and their efficacy against *O. ovatus* and *O. sulcatus* weevils. Particularly *S. kraussei* is known to infect larvae actively at lower temperatures than species of *Heterorhabditis.*

The results proved that at least in small-scale use the nematodes were easily spread through the irrigation system into the field. We were not able to prove the efficiency of the nematodes against larvae because of too low level of both species populations in the experimental cages in the field. The number of nematodes in soil samples remained quite low throughout the experiment. *H. bacteriophora* and *S. kraussei* both survived the winter in 2003-2004. The amount of nematodes in the samples taken in spring 2004 was approximately the same as in those taken in September the previous year. The method still needs to be investigated in practical conditions as an integrated part of the drip irrigation system. In the areas of high infestation risk of wingless weevils regular use of entomopathogenic nematodes may be advantageous.