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## NJF Seminar 389

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

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Protection in Sustainable Strawberry  
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## **Integration of biological mite control into outdoor strawberry production: a matter of efficacy and economy**

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Chemical control of the strawberry tarsonemid mite *Phytonemus pallidus* is difficult, and preventive methods only guarantee control for the planting year. Even initially very low mite population in spring can seriously injure strawberry during two months of flowering and harvesting period. Late season infestation leads to diminished yield next year. The two-spotted spider mite *Tetranychus urticae* is an occasional pest which is only injurious in warm and dry summers. In plastic tunnels, and sometimes under gauze cover spider mites can be noxious and difficult to control due to resistance.

Ten years experiences in experimental and practical fields prove that effective control of strawberry mite can be achieved by inundative introductions of the predatory mite *Amblyseius cucumeris* (Phytoseiidae). Lately, *Neoseiulus barkeri* has been included to experiments compare its efficacy especially in higher strawberry mite densities. As these species are not effective against the two-spotted spider mite, *Amblyseius californicus* and *Phytoseiulus persimilis* are recommended to use in tunnels but not in unprotected fields.

In unsprayed older strawberry fields phytoseiid species occur often naturally. The species composition differs depending on sites and environment, but typically *Anthoseius rhenanus* is the most common species, in some fields *Amblyseius reductus*. Introduction of foreign *A. cucumeris* has not diminished number of initially present native species. *A. cucumeris* has been found to survive over winter only exceptionally, and annual introductions are necessary.

According to our experiences, introduction of 10-20 adult predators per plant is needed if the initial strawberry mite density is less than 1/leaf. This means 0.5-1 million predators/ha (ca. 125-250 €), considering that part of the predators never reach the plants. Depending on the method, spreading of the mites takes 1-2 h/ha (15 €/h), hence the total costs are ca. 140-275 €/ha. This is easily compensated by higher yield with better quality. If the introduction is delayed due to pesticide sprays, and the initial population is higher even higher dose of predators is advisable.

There is an obvious conflict between chemical pest control and biological mite control. Practically, all insecticides are harmful to phytoseiid mites whereas fungicides are tolerable. Monitoring of the key insect pests and well advised timing of selected insecticide sprays considering the best time for introduction of predatory mites are needed for integration of biological mite control and chemical pest control. Biological mite control is most successful in organic or non chemical production. In flourishing, adequately irrigated and fertilized fields biological control of the strawberry mite is more successful and profitable than on stressed, weak plants. Integration of biological control as a part of IPM practices requires careful assessment of initial mite population and calculated timing of both pesticide treatments and introduction of predators.