



FruitGrowth -Novel organic solutions securing future growth –WP 3.1 Ecological infrastructures

Lene Sigsgaard

Introduction

The project Fruitgrowth aims and objective are to increase the Danish production of high quality organic apples through delivering: New robust cultivars, Storage solutions to extend seasonality, Implement novel mechanical/biological technologies and compounds to optimally manage weed, diseases, pests and beneficials during production. Partners include Aarhus University (Michelle Williams head the project), University of Copenhagen, University of Southern Denmark, 3 advisory services, industry and growers. WP 3 focus on insect pests and diseases with a study of ecological infrastructures (L. Sigsgaard, KU, Ventegodtgaard, Strandegaard), use of *Trichogramma* against codling moth (*Cydia pomonella*) (L. Sigsgaard, KU), mechanical control of apple scab (Maren Korsgaard, KU), plant extracts to control apple sawfly (Klaus Paaske, AU).

Natural control

Pests and diseases cause quality and yield reductions in organic apple. This means that the Danish production of apples is small and unstable. At the same time there is a large potential for organic apple production in Denmark, as consumers have become increasingly interested in organic foods. Prevention is central to be able to stabilize and increase production. A central part of prevention is to protect natural enemies of pests so they can contribute to control. This way the need for direct control can be reduced. As a part of the project Fruitgrowth we assess the role of flower strips for natural control of the codling moth in organic apple orchards.

The value of flower strips for natural enemies

Ecological infrastructures are the places in and around the orchard where beneficial insects such as predators and wild bees can find food and habitat and this way be protected and augmented for the benefit of the farm. Examples are hedgerows, flower strips, patches of wild vegetation, extensive grass areas, banks, wood piles and waterholes. IOBC, the International Organization for Biological Control in it's guidelines recommend at least 10% ecological infrastructures for a farm. By planting flower strips increased plant diversity is obtained. This way more herbivores associated to the flower strip plants can live in the orchard. The increased number of prey as well as access to pollen and nectar increases numbers of spiders, predators, parasitoids and wild bees. Flower strips also provide important habitat and overwintering sites for the natural enemies. A prolonged flowering is attractive and flowers should be good sources of nectar

and pollen for beneficials while their value for insect pests should preferably be less. Also the agronomic aspects of the strips should be considered. For example potentially problematic weeds should be avoided.

Flower strips and codling moth

While it is well documented that flower strips will augment natural enemies, there are fewer results showing an effect on pests. This may be because most studies are only 1-3 years long. The beneficial effect is not obtained at once. Thus a Canadian study found that after establishing flower strips in an orchard the number of natural enemies gradually increased and the damages gradually reduced over a 5 year period. A Swiss study documented that flower strips reduced the aphid *Dysaphis plantaginea*. One reason was that there were more spiders and adult aphids were trapped in their webs. In Denmark there are already some organic orchards with flower strips, but their role for natural enemies and pests regulation is not known. We assess codling moth and natural enemies in the orchards with and without flower strips and as a function of distance from flower strip. This can contribute to an assessment of the role of flower strips and how close flower strips should be placed in an orchard.