

# Hospitality management for Apple growers

By

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When most of us are asked to imagine where our apples come from, we conjure up romantic images of lush canopies dotted red with the forbidden fruit. An orchard as depicted in Holy Scriptures and by the ancients perhaps, the Garden of delight is nothing short of a fantasy when we trace back modern day fruit orchards. In these intensive production systems, *high-density* and *high-tech* are the two key components in keeping the apple affordable at our local grocer.

Making optimal use of every square inch on the farm, the fruit grower in The Netherlands has no choice but to opt for this high-density system, i.e. as many apple trees as feasible. Land does not come cheap and neither does labor; this together with apple imports from overseas forced the fruit industry to rethink orchard design. Orchards increasingly had to become more *efficient* in the input-output ratio. This meant that the apple orchard as it was known, and to this day still conveyed in advertisements as a place where families climb unto ladders and reach for that perfect red delicious, ceased to exist and industrial design proved to deliver the most economic model for producing apples for the masses.

Such systems of high-density plantings require close attention from the grower, especially when it comes to controlling pests & diseases.



Due to the proximity of the trees to one another the spread of diseases, be they fungal or viral, occurs at an insurmountable pace. Orchard management therefore is crucial in

assuring high quality fruit. Conventionally, an array of pesticides has been at the disposal of the fruit grower to suppress key pests and diseases. Whether the chemicals are utilized within integrated pest management (IPM) systems or simply constitute the only means of pest management, both systems had to rethink plant protection once the market and government voiced their concern over public health and the environment.

Due to the worrying condition of chemical infiltration virtually in all facets of public life, less harmful ways had to be devised to protect the fruit grower's asset. Pesticides contaminate both surface and groundwater, not to mention excess residue of pesticides found on fruit in the market, this has led the industry to employ ecological methods of controlling pest and disease.

This basically meant mimicking natural ecosystems in general and food webs in particular. Once a so-called predator of a major pest is identified, mainly by observing the organism in its natural habitat, it is evaluated for its biological control potential. This potential is decisive in whether or not a biological control agent (BCA) is introduced in the fruit orchard. Besides the BCA's aptitude, a strong emphasis in research is placed on

how to integrate the organism within a certain orchard management system with all its spray regimes and last but not least: is the orchard hospitable for the BCA?

If it is, implying there should be ample food and shelter opportunities for the beneficial organism, it is of utmost importance for the sake of both fruit grower and natural enemy to be attentive when pesticides are applied. Making an informed decision when it comes to the type of pesticide used is crucial in knowing the repercussions of that product. Unintended side-effects can inhibit the colonization and uniform distribution of the BCA throughout the orchard without the fruit grower ever knowing where the impairment is coming from.

Due to the contemporary nature of the challenge in improving "orchard hospitality", much of the pesticides used in fruit orchards are tested for their side-effects i.e. negatively affecting non-target organisms.

The experimental station PPO - Applied Plant Research - in Randwijk, The Netherlands, conducts such tests to determine the type of side-effects of a specific herbi-, fungi- or insecticide. These plant protection products are evaluated for their selectivity in suppressing the target pest only, a standard that needs to be complied with by the manufacturer if and when the chemical is destined for the commercial fruit grower. PPO has been spearheading the evaluation of the common European earwig (*Forficula auricularia* L.) as a natural enemy of some key apple pests in The Netherlands. The insect has been released in orchards but failed to establish itself and several causes were pinpointed. However, the change in assortment of pesticides used is suspected due to a substantial decline in earwig numbers during the past two decades in Dutch apple orchards. Chief among the reasons thought to

restrain the earwig in contributing significantly to pest management is the application of Amitrole-based herbicides. Beneath the trees weed-free strips are maintained to prevent competition for nutrients and moisture. The earwigs have been found to habituate the very strip beneath the trees, especially for laying their eggs which they do in tiny burrows right beneath the soil surface.

Tests have been taken both under controlled and semi-field conditions, in which the earwigs were exposed to a number of standard practice pesticides used in Dutch apple orchards. Cases of acute toxicity were limited. But the earwigs subjected to Amitrole containing herbicides exhibited an above average embryo mortality. Especially the earwigs that were under semi-field conditions showed a high percentage of eggs that did not hatch. Due to external influences, such as an exceptionally cold winter, repetitive trials have to be set-up in the future to determine if indeed significant side-effects of commonly used herbicides are the root cause inhibiting earwig population to flourish within the apple orchard.

One thing is certain; those seeking to accommodate the earwig need to understand the fundamentals of being a welcoming host. It entails being constantly considerate and mindful of your guest, making sure the guest is shielded from any harmful forces and facilitation in the basic necessities such as food and drink. On the whole providing the conditions which will make the host and guest find comfort in each other and in the mutual benefit that will follow.