EUFRUIT

SUSTAINABLE FRUIT PRODUCTION

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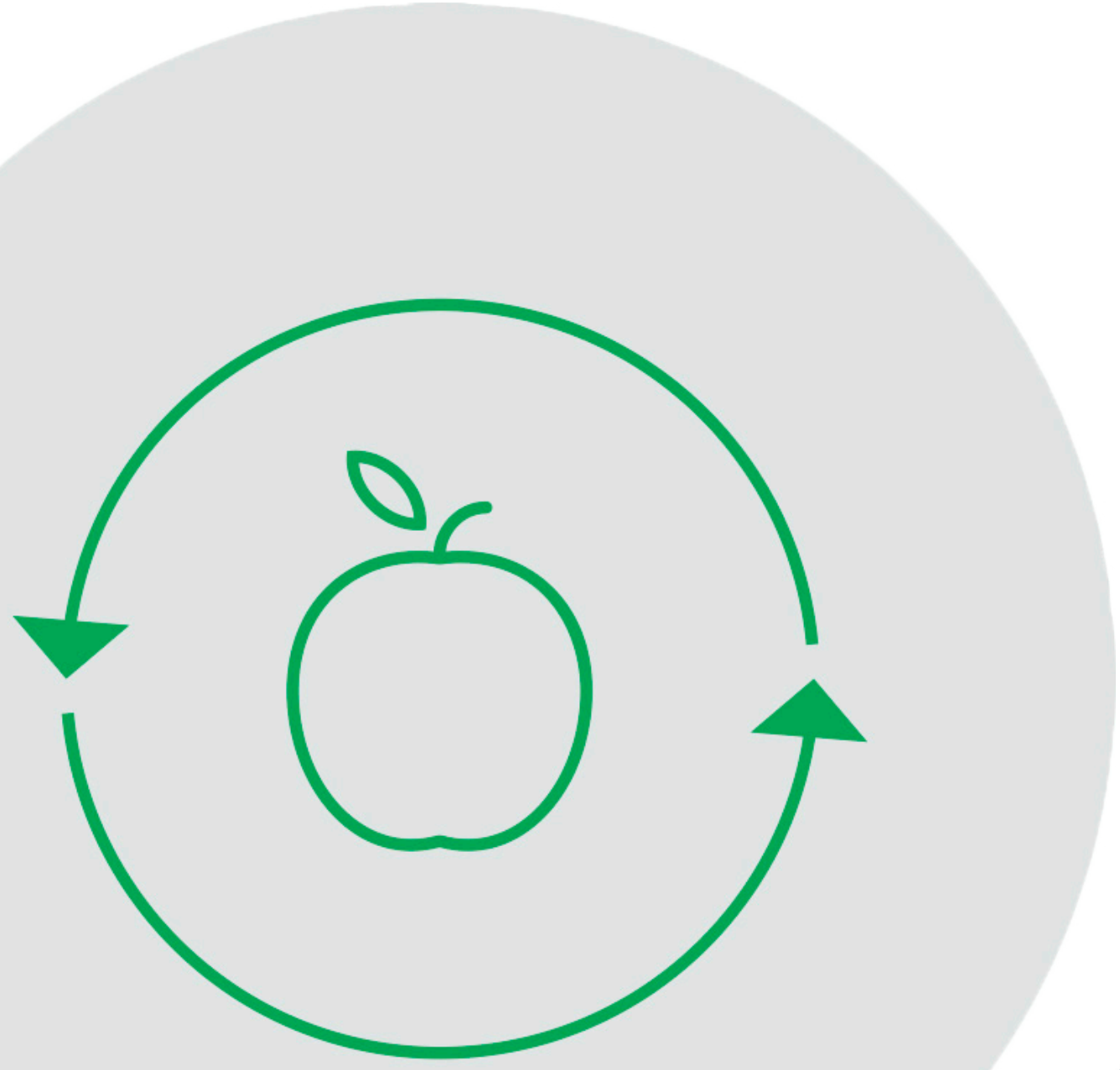

In 2016, an International Expert Group (IEG) including 15 organizations was established and over three years they have contributed to scanning and discussing their national best practice and exchanging knowledge on sustainable fruit production. This IEG had a broad focus and therefore was aligned to two EUFRIN Working Groups called: 'Water Relations and Irrigation', and 'Fruit Thinning'. IEG members are also representatives on many national networks allowing the exchange of information between fruit producers and researchers, which is very useful to increase the knowledge around the latest strategies to ensure optimization of fruit production systems in a sustainable way.

The state-of-the-art was evaluated across country partners and three key focus areas were discussed at the IEG meetings. The IEG focused on exchanging information on the different approaches, some of these techniques are currently being used by growers and others are very much at the experimental stage. These focus areas included:

Thinning

For apples, chemical thinning with various products is used in almost all production areas in Europe. The main products used are NAA, NAD, ATS, Brevis, BA-6, Ethrel. The products are used depending on variety and the climate. In warm climates the reaction to 6-BA is very good, only some varieties such as Red Delicious, Rubens and Fuji do not react so well to 6-BA.

Brevis is used more and more. Varieties with strong problems with biannual bearing such as Elstar, Fuji and Red Delicious are treated with blossom thinners. Including ATS and Ethrel to promote early fruit drop and initiate return bloom. In general, everybody uses a combination of chemical products depending on variety and weather conditions.

Mechanical thinning (Darwin machine) is used in organic fruit production on varieties with good fruitset such as Elstar and Gala. In The Netherlands, mechanical thinning is hardly used because results with, for example, the Darwin thinner, have been inconsistent. In addition, the often-used spindle shape (80-100 cm trees) is less suitable for this machine. In Italy, for peach, no chemical thinning is available and mechanical thinning is used, but still needs improvement.

Brevis (metimitron) is now registered in many European countries. It is a strong thinning agent for pears and apples. Research evaluation and recommedantions are needed to explain the variation in results. To-date the focus has been on the effect of temperature and radiation during the days before, during and after tretatment.

In Spain, Italy, Belgium and Holland different DSS-models, mostly based on estimated carbohydrate-balance, (including RIMpro, Adema, AgRadar, Malusim) or reduced fruit growth (including Greene method) are being tested as a guide to improve the effectiveness of chemical thinners.

Water/nutrients

The IRRY water model has been updated and tested (Netherlands). The model has been adapted to automatic loggers of the water content in the soil. In practice, most fruit growers use Watermarks (tensiometers) to measure water stress. Research results on the response of trees to water stress during different periods of the growing season have been implemented into commercial orchards. Most fruit growers accept specific water stress levels (60-70 kPa) during the summer period, depending on growth. However, water stress is unacceptable during the pre-harvest period and during the fruit cell division period. Fruit growers are very interested in logging sensor-measurements automatically on their computer/in the cloud.

Water scarcity in semi-arid regions of Europe, like in Spain and Italy, threatens the sustainability of fruit tree orchards unless irrigation water is optimized and scheduled in deficit irrigation strategies. The correct use of the most successful deficit irrigation strategies, such as regulated deficit irrigation requires both a good understanding of demands of the crop at different phenological stages and physiological mechanisms involved in the response of plants to water stress, and the use of reliable and sensitive indicators of water stress.

In southern Europe (Spain and Italy) the use of shading nets is used as a method to reduce water needs. In Italy in some parts the fruit growers can use the IRRIFRAME balance model to secure a better insight on the evaporation of the trees. Decision support systems are being optimized to combine the models Fertirrinet and PERFRUTTO; based on fruit measurements in the period of 2 months after F2. In some regions soil water content is being determined and data collected on the internet (using Decagon sensor) so a continuously measurement combined with vapotranspiration models can give better info to consultants and individual fruit growers on how to irrigate. They have shown that fruit growers can deliver the same crop with a 35% reduced water supply comparison to fruit who independently control their watering system.

In more temperate climates (Denmark), fruit orchards are drip irrigation at 50 cm distances for the first 3 years after planting, and thereafter irrigation is typically very limited, only in drought situations. In intensive apple, pear and stone fruit drip irrigation is very common. In strawberries irrigation is necessary in harvest years, both before and after flowering and in autumn to ensure flower bud development.

Similar, Hungarian sweet cherry orchards are not irrigated, because the natural precipitation (550 to 700 mm annual yearly precipitation) is adequate. Intensive orchards are irrigated, the growers use drip irrigation or micro sprinklers. The practical trials show that additional water gives more growth and more production to fruit orchards.

In the south-west part of France, growers who have decided to apply precision irrigation are mainly producers of kiwifruit, hazelnut, walnut, prune and sometimes, apple, pears, peaches and apricots. They find that controlled irrigation results in better quality fruit and a longer storage quality.

Organic and Integrated Pest Management (IPM)

In most European countries, the government has a relatively practical approach towards the use of environmental-friendly products, however registration of new chemicals for use in organic production systems are limited. Organic production is increasing in Denmark, Romania, and Italy following the large and increasing demand by consumers. In 2016, 22.8% of the total apple area was organic and 6.7% of pears in Denmark. Organic treatment strategies for a full season are available for apple, pear, sweet and sour cherry, black and red currant and strawberries outside.

In Romania, organic production has increased and according FAO statistics, of the organic cultivated orchards, approximately 86% are under conversion and only 14% are certified. For organic fruit growing in Romania, six factors are important: apple scab resistant varieties; the use of ameliorative plants in soil preparation before planting; use of pheromone traps for monitoring and risk assessment of pests; protection and monitoring of useful orchard fauna; alternative organic pesticides and in many orchards mechanical weed control is used as an alternative for herbicides.

Whereas in Holland, despite the strong increasing consumer demand, the extent of organic fruit growing is not rapidly increasing. This is due to the difficult official registration of organic products. Products which are allowed in many countries and recognized as fully organic by the organic are still not approved by Dutch law.

In Germany the exact spraying intervals and exact timing of pesticide allow berryfruit producers to use various pesticides but at the same time prevents detectable residues in the harvested berries. Using these recommended and developed spray schedules ensures integrated fruit production but at the same time meets the demands of the retailers. Growing berryfruit under cover (protected production) has recently increased in Northern Germany, due to the advantages that less herbicides, fungicides and insecticides are needed, higher yield/m2 are achieved and harvest can be secured (as it is independent of the influence of rainfall). Up to 60% of the northern strawberry producers use a reduced spraying sequence of classical fungicides supported by beneficial organisms.

The IEG on sustainable fruit production has delivered 3 synthesis reports (at EU level) based on 57 scanning reports (at Regional/National level), 39 seminars and workshops, 188 field-based meetings, open days, field visits, grower meetings, 58 participation in industry events, exhibitions, conferences with industry stakeholders and 32 events aimed at the general public.

Outputs, reports & communications see:

http://kp.eufrin.eu/

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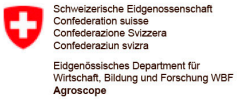
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