EUFRUIT

IMPROVEMENT OF FRUIT STORAGE METHODS

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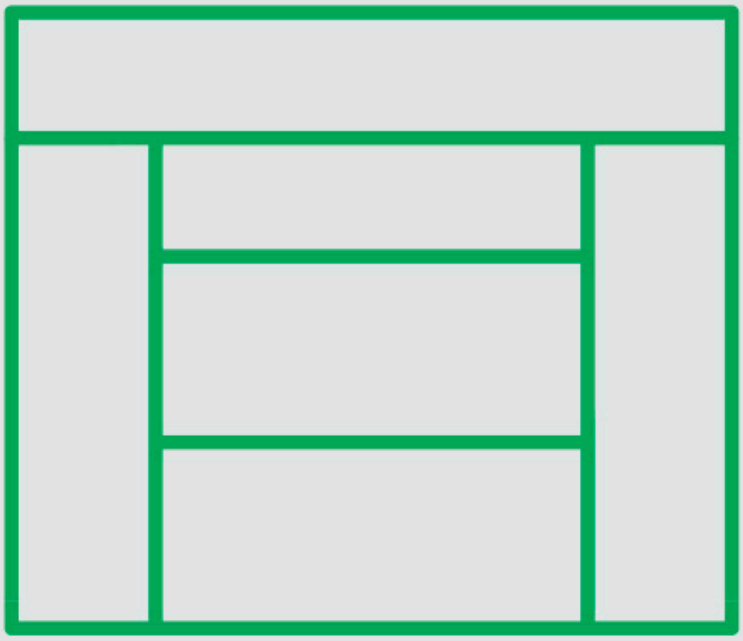

In 2016, an International Expert Group (IEG) including 17 organizations was established and has over three years contributed to scanning and discussing their national best practice and exchanging knowledge on fruit storage and postharvest technologies in the supply chain to secure fruit quality. This IEG was closely linked to the EUFRIN Working Group called: Postharvest and Fruit Quality. IEG members are also representatives on many national networks allowing the exchange of information between fruit producers, postharvest storage facilities, postharvest researchers, which is very useful to increase the knowledge around strategies to secure fruit quality and to minimize fruit loss during the storage and distribution chain.

The state of the art was evaluated across country partners and a total of 8 key 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 approaches included:

DCA-storage systems (Dynamic Control Atmosphere) are still being evaluated by research organizations. There is a distinction between DCACF, DCAETH and DCARQ, where CF stands for chlorophyll fluorescence, ETH stands for ethanol and RQ stands for respiratory quotient. Use of CF is the most popular method to determine the Anaerobic Compensation Point (ACP).

Different sensors like HarvestWatch (Satlantic Inc., Canada), ApplePAM (Walz GmbH, Germany) or Fruit Observer (Besseling Group B. V., The Netherland) are testing different systems at different research organizations. DCAETH is another technology to determine the ACP by measuring ethanol in the atmosphere of the storage room (Dynamic Control System, DCS, Storex, The Netherland) or ethanol plus ethyl acetate and acetaldehyde in the fruit using fruit samples (Lower Elbe Region, Austria). Finally, the DCARQ technology uses the respiratory quotient between CO2 production and O2 consumption for measuring the ACP. There are companies such as Van Amerongen from the Netherland with the ACR system (Advanced Control of Respiration) and Storage Control Systems Ltd from Great Britain / USA with their SafePod/LabPod system on the market.

The effect of DCA on fruit quality (positive/negative effect on firmness, acid content, physiological disorders) and the comparison of different DCA technologies are the focus of research across the EU.

On farm level the DCA technology requires know how, investment in hardware and is suitable in organic production.

1-Methylcyclopropene (1-MCP) and its effect on fruit quality (fruit firmness, acid content, effect of different physiological disorders) are also still a research focus across the EU. However, they focus more and more on fruit other than apples, e.g. pears. New 1-MCP products that may be registered in the future in the EU include new formulations such as Harvista, these are currently being evaluated. At a farm level, the 1-Methylcyclopropene (1-MCP) technology requires expert know how, is an energy and CO2 saving technology but it is not suitable for organic production.

Sustainable approaches including, energy saving e.g. by using new cooling technologies like EC fans (electronically commutated fans) or better airflow throw the stacks of storage boxes is more and more in focus for some research organizations. Especially the effect of temperature, ventilation, placing boxes in the storage room (distance, space between boxes, walls and evaporators) and technical changes in room design are key topics. At the same time, the aim is to reduce water loss of stored fruit knowing that the energy or heat input leads to more cooling and more cooling leads to more water loss. CO2 reduction by improving the technology of cold storage (energy loss) and the reduction of food loss in a high quality cold chain is an important focus area.

Most research organizations are focused on how to adapt existing and new technologies to optimize postharvest handling of **new apple and pears varieties**. The first goal is to determine the optimal harvest date and storage conditions (e.g. temperature and O2/CO2-level), the compatibility of these new varieties to 1-MCP and the usefulness of a treatment. Currently, cultivars which are in focus are Kanzi (Nicota), Migo (Cepuna), Sweet Tango, Natyra, Rockit and different red flesh varieties. At the farm level, the investment into a new variety requires new, know-how on handling the variety both pre- and postharvest, therefore research and extension service need to keep up with the fast moving introduction of new varieties.

To **avoid food loss** by rotting, physiological disorders or bruising is a priority postharvest research area. Measuring specific volatiles that are related to specific storage diseases, using new metagenomics determination and hot water treatment (HWT) are examples of new diagnostic and control technologies that can help

reduce microorganism infections or the use of chemical pesticides in pre- and postharvest in apples (are also relevant approaches for stonefruit). At the farm level, the HWT technology is particularly relevant for organic production because of a lack of effective fungicides that can be used in the organic system.

Many research organizations are focused on physiological disorders, given the need to understand the cause of the disorder, prediction of the disorders (why and when it is likely to occur), better prediction and optimization of the fruit harvest date relative to development of the disorder, prediction of and description of the symptoms. Knowledge exchange between researchers and fruit growers and warehouse operators is essential.

In order to avoid bruising of apples and pears, new technologies are being evaluated to objectively measure bruising e.g. to determine the sensitivity of different fruit varieties. The physiological background of the development process during bruising, approaches to avoid bruising or recommendations for handling procedures for the fruit grower (videos for picking personal, optimization of the grading machines, handbooks) is still in focus. At the farm level, extension, education and control of picking and sorting staff is still necessary to avoid losses in fruit quality.

Some research organizations are evaluating the application of different **fruit quality analyzing technologies**. These can be categorized into destructive technologies such as the Pimprenelle (e.g. Setop, France) or where the majority of the development is, in new non-destructive technologies that determine quality based on e.g. using near infrared (NIR) measuring technologies.

Extending the storage life and shelf life of stone and berryfruit is an increasing priority for some research organizations. Improvement in fruit and stem quality through reducing cracks, diseases, accurate assessment of harvest maturity, forced cooling systems and better storage solutions are key focus areas.

Improvement of the **quality of processing products** such as puree is a focus are in some research organizations. Evaluations include determining the effect of preharvest, harvest and postharvest factors on the quality. The relevance of non-destructive measurement technologies are also a focus area.

The IEG on improvement of fruit storage methods has delivered 3 synthesis reports (at EU level) based on 41 scanning reports (at Regional/National level), 34 seminars and workshops, 116 field-based meetings, open days, field visits, grower meetings, 91 participation in industry events, exhibitions, conferences with industry stakeholders and 17 events aimed at the general public.

Outputs, reports & communications see:
http://kp.eufrin.eu/

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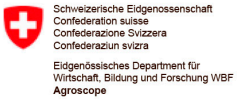
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