Synthesis report 2017
WP2 – Performance of new fruit varieties

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WP: 2

IEG thematic area: Performance of new fruit varieties

Covered NUTS 3 regions: DK011 Copenhagen, DK012 Copenhagen and its environs, DK013 North Zealand, DK014 Bornholm, DK021 East Zealand, DK022 West- and South Zealand, DK031 Funen, DK032 South Jutland, DK041 West Jutland, DK042 East Jutland, DK050 North Jutland, BE211 (Arrondissement. Antwerpen), BE212 (Mechelen), BE213 (Turnhout), BE221 (Hasselt), BE222 (Arr. Maaseik), BE223 (Tongeren), BE231 (Aalst), BE232 (Dendermonde), BE233 (Eeklo), BE234 (Gent), BE235 (Oudenaarde), BE236 (Sint-Niklaas), BE241 (Halle-Vilvoorde), BE242 (Leuven), BE251 (Brugge), BE253 (Ieper), BE254 (Kortrijk), BE255 (Arr. Oostende), BE256 (Arr. Roeselare), BE257 (Tielt), BE258 (Veurne), BE310 (Nivelles-Nijvel), BE331 (Huy-Hoei), BE332 (Liège- Luik), BE334 (Waremme-Borgworm), BE335 (Verviers), FR8 Méditerranée; FR81 Languedoc-Roussillon, FR6 SUD-OUEST, FR512 Maine et Loire, FR611 Dordogne, FR812 Gard, DE6 (Hamburg), DE8 (Mecklenburg-Vorpommern), DE9 (Niedersachsen), DEF0 (Schleswig-Holstein), DEE0 (Sachsen-Anhalt), DEA (Nordrhein-Westfalen), DE111, DE112, DE113, DE114, DE115, DE116, DE117, DE118, DE119, E11A, DE11B , DE11C, DE11D, DE121, DE122, DE123, DE124, DE125, DE126, DE127,DE 128, DE129, DE12A, DE12B, DE12C, DE131, DE132, DE133, DE134, DE135, DE136, DE137, DE138, DE139, DE13A, DE141, DE142, DE143, DE144, DE145, DE146, DE147, DE148, DE149, DE600 Hamburg, DE932 Cuxhaven, DE933 Harburg, DE939 Stade, DEF09 Pinneberg, NL1-NL4 + NLZ Holland; NL 224 zuidwest Gelderland, NL 226 Arnhem/Nijmegen, NL230 Flevoland, NL310 Utrecht, NL321 Kop van Noord-Holland, Nl322 Alkmaar en omgeving, NL338 oost Zuid-Holland, NL33A zuidoost Zuid-Holland, NL341 Zeeuws-Vlaanderen, NL342 overig Zeeland, Nl411 west Noord-Brabant, NL413 noordoost Noord-Brabant, NL414 zuidoost Noord-Brabant, NL421 noord Limburg, NL422 Midden-Limburg, NL423 zuid Limburg, ES620 Murcia, UKG11 Herefordshire, UKG12, Worcestershire, UKH12 Cambridgeshire, UKH16 North and West Norfolk, UKH17 Breckland and South Norfolk, UKJ22 East Sussex, UKJ35 South Hampshire, UKJ36 Central Hampshire, UKJ37 North Hamphshire, UKJ41 Medway, UKJ42 Kent, UKJ43 Kent Thames Gateway, UKJ44 East Kent, UKJ45 Mid Kent, UKJ46 West Kent, ES618 Sevilla, ES511 Barcelona, ES512 Gerona, ES513 Lérida, ES514 Tarragona, CH0 Schweiz/Suisse/Svizzera, ITH51-59 Emilia Romagna region, ITH10 Bolzano-Bozen, HU101 Budapest, HU102 Pest, RO111, RO112, RO113, RO114, RO115, RO121, RO122, RO123, RO124, RO125, RO126, RO211, RO212, RO213, RO214, RO215, RO216, RO221, RO222, RO223, RO224, RO225, RO226, RO311, RO312, RO313, RO314, RO315, RO316, RO317, RO321, RO322 RO411, RO412, RO413, RO414, RO415, RO421, RO422, RO423, RO424. HU101, HU102, LT001 Alytaus apskritis, LT002 Kauno apskritis, LT003 Klaipėdos apskritis, LT004 Marijampolės apskritis, LT005 Panevėžio apskritis, LT006 Šiaulių apskritis, LT007 Tauragės apskritis, LT008 Telšių apskritis, LT009 Utenos apskritis, LT00A Vilniaus apskritis.

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No. IEG members: *Total: 31*
Male: 25
Female: 6

Document history

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1	09/08/2016	First version (meeting 27+28/06/2016)	ir. Jef Vercammen jef.vercammen@pcfruit.be
2	31/05/2017	Second version (meeting 01+02/03/2017)	ir. Jef Vercammen jef.vercammen@pcfruit.be

Document overview

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Synthesis findings

On March 1st and 2nd 2017 a meeting of the International Experts Group for EUFRUIT WP2 was organized at CTIFL, 751 Le Balandran, 30127 Bellegarde (France).

Participants:

EUFRUIT Partners: Vercammen Jef (pcfruit- Partner 2), Charlot Gérard, Codarin Sandrine, Mathieu Vincent and Ruesch Julien (CTIFL - Partner 3), Ravesloot Marc and van der Heiden Alma (StDLO – Partner 5), Fernandez Felicidad (NIAB-EMR - Partner 6), Iglesias Ignasi (IRTA - partner 7), Riedl Andreas and Schweizer Simon (Agroscope - Partner 8), Guerra Walter and Zago Massimo (Laimburg - Partner 9), Asanica Adrian and Stanica Florin (USAMV – Partner 10), Bujdoso Geza (NARIC - Partner 11), Bradlwarter Markus (SKST - Partner 14), Giovannini Daniela (UNIBO – partner 20) and Audergon Jean-Marc, Lecherbonnier Loïc, Quero-Garcia José ane Tuèro Christophe (INRA – Partner 21).

EUFRIN Partners: Berra Lorenzo and Nari Davide (Agrion), Dallabetta Nicola and Pantezzi Tommaso (FEM), Fortiric Akstic Milica (Faculty of Agriculture), Ikase Laila (LUA), Labuschagne (Provar), Meland Mekjell (NBIO), Pinczon Du Sel Sara (Ta Tapy) and Suran Pavol and Zeleny Lubor (VSUO).

Excused

EUFRUIT Partners: Marianne Bertelsen (AU - Partner 1), Hilbers Jörg and Kockerols Martin (OVA - Partner 4), Perren Sarah (Agroscope - Partner 8), Sasnauskas Audrius (LRCAF - Partner 12), Dasque Jacques and Panegos Pauline (AREFLH – Partner 13), Mayr Uli (UHOH - Partner 19), Tartarini Stefano (UNIBO - Partner 20) and Laurens Francois (INRA - Partner 21).

Not present: FRESHFEL (Partner 15).

Meeting:

After a short presentation of the EUFRUIT-project by J. Vercammen, leader of WP2, each partner has presented its scanning of EUFRUIT WP2 . *(In the IEG-meeting in Bologna it was decided to focus in the second year on variety testing of stone fruits.)* In this synthesis also the scannings of the EUFRUIT WP2 partners that were excused are included as well as the scanning of the EUFRIN partner CREA, to the extent that they concern variety testing of stone fruits. Next meeting in 2018 will focus on variety testing of berry fruit (strawberries and small fruits).

Scannings:

MEMBERS EUFRUIT WP2

AU

The only stone fruit research at AU-FOOD is on sour cherry. The main challenges in present Danish sour cherry production relates to improving the relatively low crop loads in Danish Stevnsbaer, caused by small fruit size in Stevnsbaer and relatively low fertility, which is challenged by 1) climate aspects, especially spring frost that reduce crop loads, 2) possible genetic/ epigenetic related infertility of some cultivars incl. risk of abnormal pollen meiosis in early spring, 3) attack by fungal diseases especially cherry leaf spot and *Monilia laxa* due to the high precipitation frequency, 4) pest attack especially *Rhagoletis* sp. and potentially *D. suzukii* in near future. In addition future 'over the row' harvesting methods require smaller trees and different

pruning and shaping methods. Development trends for the near future in addition to yield focus, include maintaining the high fruit quality (very high sugar, acid and color) by Stevnsbaer, developing sustainable cultivars for organic production, focus on breeding cultivars with very high fruit quality that specifically match individual high quality products of different type (optimizing gene x product match) and genetic diversification away from main European cultivars to cope with international very strong competition due to differences in production costs and country specific subsidies.

Pcfruit

The **sweet cherry** assortment is best completed with a self-fertile variety that is not susceptible to frost or cracking. The ideal variety should be productive, early or late ripening, low in vigour and have a good fruit quality (firm, large and dark) and a good flavour. In 2017 we have 68 sweet cherry varieties in the first screening. After 4 to 5 production years a first selection is made. Varieties that are not good enough are grubbed. From the best varieties in the first screening mostly 20 to 25 trees are planted in a second screening (Level 2).

Because of the continuing crisis in the apple growing the question is posed whether there are, in addition to pears and sweet cherries, other alternatives. In the first place, it is thought here about apricots. On the one hand it is hoped in this way to spread the work and risk. On the other hand, climate change also plays a role. Therefore we have planted the first **apricots** in spring 2015. At that time also **Japanese plums**, hazelnuts and walnuts were planted at the Experimental Garden for Pome and Stone fruits (PPS).

For **apricots** the aim is to determine whether the selected varieties are suitable for our climatic conditions. Here we especially have looked for varieties with a late flowering time (and therefore should be less sensitive to spring frosts) and a late picking time (August), so the harvest is later than Sweetheart and earlier than Conference. In this way there is a spreading of labor. Moreover, there is no overlap with the imported varieties of the Southern countries.

For plums the market is asking for large fruits. A possible way are the **Japanese plums**.

There are some important challenges and gaps for stone fruit growing, especially for sweet cherry growers:

- As for new apple and pear varieties some new cherry varieties are no longer available for all cherry growers, because they are launched as a club variety
- Novelties are planted without proper testing
- Infestation of all stone fruit species by Drosophila suzukii
- Infestation of sweet cherries by Little Cherry Virus
- Sweet cherries are a small crop, which means that generally there are little products available to control pests and diseases
- Most of the Belgian cherry orchards are planted without plastic covering

CTIFL

Scanning 1: Sweet cherries

In France, breeding program is carry on by two actors, one is public, INRA and one is private, Agro Sélection Fruits. The evaluation of the plant material is organized in different steps involving various actors. The breeders are responsible of hybridization and creation of the new varieties. There are 9 editors for the cherry. The editors are responsible of the distribution of the varieties. The varieties are following a process to be registered and evaluated. INRA (French National Institute for Agricultural Research) is responsible of the registration of the varieties in the "catalog" and realize the DUS (Distinction, Uniformity and Stability) phase. After this step, the Ctifl, INRA and regional technical centers are proceeding to the evaluation of new cultivars.

Each year 12 cherry cultivars are introduced and assessed on the different sites of the network. The criteria that are observed are the tree (vigor, shape…), the flowering and phenology (floribondy, pollination), the agronomic potential (maturity, entering in production, yield and fruit size), the fruit (presentation / attractiveness) and the sensitivity to cracking and *Monilia*. The evaluation of vegetal material is led on rootstocks and on new cultivars.

The objective of cherry varieties development in France is based on various goals. One goal is to extend and complete the planning of maturity to dispose of good varieties during all the season and for all subspecies. Especially we need to replace Burlat, the most important early variety, which has several defaults (sensitive to mold winter, insufficient size and firmness). The ideal variety need to be very productive with a good fruit size and need to guarantee the regularity of production (not susceptible to mild winter) and not sensitive to double fruits. We also plan to select blush varieties to complete the current choice which is limited to one variety (Rainier).
The new varieties have to propose a good organoleptic quality and a good presentation of the fruits. Ideally, we also try to select varieties which are self-fertile and with less sensitivity to cracking and *Monilia*.

Scanning 2: Peaches and apricots

Breeding programs are very intense for peach and apricot in France. The evaluation of the plant material is organized in different steps involving various actors. The breeders are responsible of hybridization and creation of the new varieties. The editors are responsible of the distribution of the varieties. The varieties are following a process to be registered and evaluated. INRA (French National Institute for Agricultural Research) is responsible of the registration of the varieties in the "catalog" and realize the DUS (Distinction, Uniformity and Stability) phase. After this step, the Ctifl and regional experimental center are proceeding to the evaluation of new cultivars.

About 60 cultivars for peach and 50 cultivars for apricots are introduced each year and assessed on the different sites of the network. The criteria that are observed are the tree (vigor, shape…), the flowering and phenology (floribondy, pollination), the agronomic potential (maturity, entering in production, yield and fruit size), the fruit (presentation / attractiveness, physico-chemic and organoleptic characteristics, post-harvest conservation) and the sensitivity to pests and diseases. The evaluation of vegetal material is led on rootstocks and on new cultivars

The objective of peach varieties development in France is based on various goals. One goal is to extend and complete the planning of maturity to dispose of good varieties during all the season and for all subspecies. The ideal variety need to dispose of a high level of production (yield and fruit size) and need to guarantee the regularity of production. These varieties have to propose a good organoleptic quality and a good presentation of the fruits. Ideally, we also try to favorise varieties with less sensitivity to pests and diseases.

OVA

The main research topics for stone fruits at the OVA are variety testing of sweet cherries, rootstocks, planting and training systems and variety and rootstock testing of plums and prunes.

The ideal cherry variety for Northern Germany should be early large, firm, dark, productive and less susceptible for *Pseudomonas.* Less susceptible for cracking is not very important, in the meantime is the covering of sweet cherries standard in Northern Germany. Wanted are varieties for the whole cherry season.

In 2017 we have 60 new varieties in the first screening (Level 1). In the second screening (Level 2) we actually testing 6 promising new varieties (Adelise, Aida, Areko, Henriette, Mika, and Penny). In level 2 we are testing 8 to maximum 20 trees per variety. The new varieties are supplemented with 15 standard varieties. The new varieties have to compete especially with the standard of the same ripening time.

Tasteful plums and prunes are very interesting and important for the local market. Now less promising new varieties are available. In future, we will plant plums that are more colored, mirabelles, reneklodes and just a few very promising new crossings.

There are some important challenges and gaps for stone fruit growing, especially for stone fruit growers:

- Infestation of all stone fruit species by Drosophila suzukii
- Infestation of sweet cherries by *Pseudomonas*
- New varieties get pushed and are planted without proper testing
- Increasing demands in fruit quality at sweet cherries: firmness, seize, freshness
- Increasing demands for residue-free fruits

StDLO

Stone fruit is a small subsector of the Dutch fruit industry. The main crops grown are sweet cherry and plum. In southern Netherlands sour cherries are grown on a very modest scale. In Randwijk the following research and knowledge transfer activities take place:

- Study of the fruit specific characteristics of a new weak growing rootstock for plum at Randwijk and 9 other places in the Netherlands.
- Research into effective and sustainable control of the fruit fly *Drosophila suzukii*.
- Selecting big blue plum genotypes with early, intermediate and late harvest time, in order to extend the sales period of plums.
- Demonstrations of intensive training and planting systems for sweet cherry and plum, focused on pruning, fruit regulation, crop protection and nutrition.

For the variety testing on cherry or plum, there currently is no 1st screening according to the EUFRIN methodology like for apple and pear

Challenges and gaps

- Restart of the variety testing on plum and cherry.
- Systematic approach for organic production of plum.
- Intensification of plum cultivation using the dwarfing rootstock WUR S766 for new varieties.
- Evaluation of the rootstock WUR S766 in different regions of The Netherlands and Europe.
- Protection of sweet cherry crop against the fruit fly by using physical barriers (eg nets).

NIAB-EMR

The UK industry has great deal of interest in expanding stone fruit production both by expanding the season of currently well-established crops (cherry and plum) and by initiating and expanding production on novel ones (apricots, peaches ...). NIAB EMR carries out a number of commercially sensitive trials, as do other organisations, but fewer industry-wide trials are now commissioned so results are not always comparable or widely known.

Cherry trials aim to identify early or late cultivars (replacement for 'Merchant' or earlier or later than 'Regina' with better yields). They are conducted almost exclusively on GiSelA 5 rootstocks with a few grown in GiSelA 3 and 6. Most trials are conducted under nets (birds and/or SWD) or plastic tunnels (industry is increasingly under cover). Control cultivars include 'Merchant', 'Penny', 'Kordia' and 'Sweetheart'. From the last trial funded by AHDB and subsequent commercial trial, four advanced selections from the East Malling breeding programme have been identified as promising and could be released in the next two years. Recent industry uptake of Korvik and Samba has been a result of grower-led trials. 'Sentennial' also appears very promising.

Most plum trials are grown on St Julien A rootstocks but some are also testing more dwarfing rootstocks. In European plums, 'Meritare', 'Haganta' and 'Ferblue' were found to be of interest for UK production back in 2013 but uptake has been variable.

Commercially-funded trials have been commissioned or are being run directly by various producer organisations to identify promising cultivars of apricots, peaches, nectarines and Japanese plums. The general aims for all of them are to identify cultivars that: a) flower sufficiently late to avoid spring frost most years; b) produce reliable yields in UK conditions; c) mature before or alongside the early apple harvest and d) produce good quality fruit. However, results for these trials are confidential.

Whilst commercial exclusives are desirable for marketing, they limit sharing of information and material. This makes it nearly impossible to provide industry-wide recommendations on cultivars.

IRTA

Peach is the main deciduous fruit in Catalonia and in Spain, counting a total acreage of 82,000 ha. In 2016 Spain was for the first time the first European producer and the first world exporter. The most important innovation in this specie has been and still is the development of new varieties combined with efficient rootstocks and training systems. Thus, the main research topics for peach at IRTA are: **variety testing,** rootstocks and planting/ training systems adapted to the mechanization and course fruit quality to enhance the low **peach consumption** either in Spain or in other European countries.

Peach assortment has been significantly completed in the last two decades with full coloured varieties, offering optimum fruit size and shape, covering a wide range of maturity from end of May to end of September with firm, juicy and sweet flesh and optimum flavour. The ideal varieties inside each fruit type (yellow flesh peach, white flesh peach, etc.) should be rustic, well adapted to spring frost risk and warm and hot summers, productive, not early blooming, medium to low in vigour and if possible offering some tolerance to the main disease as *Monilinia*. In addition and because the main goal is the export to foreign markets, the selected cultivars should maintain the internal quality and taste for at least 30 days.

In the schema of the IRTA's variety testing program, initiated in 1996, has now (2017) in the testing plot 191 new and reference cultivars planted for the first screening. After 4 to 5 production years, a first selection is done. Varieties that are not good enough are grubbed and replaced for new varieties. In this case and because the registration/rotation of new varieties and the renewal is very high there is no a second screening (Level 2) as in apple or pear. In some particular cases, the most promising cultivars are planted in commercial plots to be used for different trials as thinning, crop load management or determination of the optimum **harvest window**.

Because the continuing crisis of grower prices, over the last three seasons a special, focus is addressed to the **new fruit types** as flat peaches or flat nectarines, deanthocyanic cultivars (white skin) or yellow skin nectarines. This will lead in the future a diversification of the common full red peaches and nectarines, creating also an innovation in the shelves and therefore an innovation for consumers.

Despite the significant progress experienced in the last two decades there are still some important challenges and gaps for stone fruit growing, especially for peach growers:

- As for new apple and pear varieties, some new peach varieties are no longer available for all peach growers, because they are launched as a club variety.
- Due to the high number of varieties released and registered in the European Union, an important number of novelties are planted without proper testing.
- Despite the high number of new varieties available for growers, most of them are similar in terms of appearance (but not always in taste), quality and agronomical performance, what means this is not a real innovation, confusing sometimes growers and consumers.
- The main challenge and progress for the future is to develop new cultivars similar in appearance and quality to the available nowadays, but including traits of tolerance/resistance to the main pest and diseases.
- To develop of brands associated to some new varieties, as done for years in apple, is still pending. It leads difficult for the consumer to identify them and consequently increased consumption.

Agroscope

The goal of a good variety range is to fulfill the expectations and demands of the producers, the market and the consumers. Variety testing is done to make a neutral evaluation of new emerging varieties in favor of production and consulting. Important requirements for a variety are good and stable yields, sturdy trees and fruits.

In 2017 around 120 international cherry varieties and around 100 plum varieties are tested at the Agroscope trial center Breitenhof, at the Agroscope trial center Conthey round 170 apricot varieties are tested. The suitability of these international varieties is tested for Swiss growing conditions and the Swiss market.

Challenges and gaps

- The majority of Swiss stone fruit varieties are imported, but the breeding goals of foreign breeders do not always meet the requirements of the Swiss production system, e.g. Monilia susceptibility of Canadian varieties in the humid climate of Switzerland
- Avoidance of infestations and the spread of the plum pox virus
- High investment costs for orchard canopies and exclusive netting
- Drosophila suzukii (SWD) has become a major pest in stone fruits, especially in sweet cherry and apricot production. Adequate management of this pest is a big challenge.
- Switzerland is a neutral country and is not a member of the European Union, nevertheless Switzerland aims to have good and strong connections and interactions with neighbouring countries.
- To bring the interests of different stakeholders along the value chain together.
- Collaboration and exchange of experiences is essential for a production focused variety testing. At the same time independent evaluations are needed. Collaboration and independency can conflict with each other.

Laimburg

At the Research Centre Laimburg, research on stone fruit currently focuses on variety and rootstock testing. The aim of variety testing is the identification of the phenology, the production and quality of the fruits, and the resistance against diseases. Variety testing is conducted in order to come up with recommendations for the growers. The predominant stone fruits cultivated in South Tyrol are cherries and apricots.

Kordia and Regina are the two main cherry varieties grown in South Tyrol. As these are medium and late-maturing varieties respectively, the working group for Berries and Stone fruit at the Research Centre Laimburg is looking for early varieties as alternatives to these predominant varieties. The mid season variety Kordia faces some problems related to replant disease. Therefore, the working group is executing tests with different rootstocks for Kordia. Finally, pollination-trials were conducted with the varieties Regina and Kordia.

As with cherries, the central research subjects in the context of apricots are also varieties and rootstocks. The variety Vinschger is the predominantly cultivated apricot variety in South Tyrol. Therefore, the working group conducted pomological tests with this variety in order to find the best selection.

A challenge for the both predominantly cultivated stone fruits is represented by spring frost. Increased research towards late flowering varieties together with knowledge-exchange with other experts of the field are crucial, in order to prevent severe losses to the growers due to frosts.

The major challenges the working group is facing in its research are related to plant protection. Regarding cherries, the central problem represents Drosophila Suzukii. Early varieties might be interesting if they mature before the presence of Drosophila Suzukii in order to reduce losses due to the insect.

In the context of apricots, the European Stone Fruit Yellow (ESFY) poses the major challenge. Currently, research on ESFY is conducted in collaboration with the Edmund Mach Foundation. More research in this regard in collaboration with other institutes is essential.

Resistant varieties and rootstocks would be interesting in order to manage the severe challenges represented by diseases. Up to now, no resistant varieties are known, but research should go increasingly in this direction.

USAMV

In the research experimental field trials we are focused mainly on variety testing, rootstocks, training systems and fruit quality. Stone fruit species in test are sweet cherry, sour cherry, plum, apricot, peach and nectarine. In the experimental fields of the USAMV we plant a minimum of 3-5 trees from each variety that we are testing, in the Didactic Farms where is possible around 10-15 plants/cultivar. Several observations and determinations are made during the testing period: productivity (kg/tree), fruit size (weight, caliber), firmness, colour, shape, sugar and acid content, appearance, taste, flavour (degustation sessions). Also some observations for the trees: flowering time, frost resistance, vigour, ramification type etc. Storability and shelf life is operated only for some cultivars depending on the workload and available logistic capacity.

From 2012 onward breeding program for sweet cherry was started at Istriţa Research Station and for genitors USAMV does pollinations tests and crossings.

NARIC

The **sweet and sour (tart) cherry** breeding programs started at NARIC Fruitculture Research Institute in 1950. There is a big stress on early ripening time, large fruit size, firm fruit flesh, sweet taste and resistance / tolerance to the most important disease and pests attacking all parts of the tree in the sweet cherry breeding program using classical breeding methods (selection form the local population and cross breeding). There is big debate on self-fertility and self-sterility, because at NARIC they believe that if a cultivar is a self-fertile, it has a tendency to overcrop, which may decrease the final fruit size. The sweet cherry market is paid by the final fruit size. There is no fruit size-based problem by the self-sterile cultivars; however, their yield may be changed year on year.

There is a keen interest in the **apricot** production in Hungary. An apricot breeding program has been running at the NARIC Fruitculture Research Institute since 1950. The most important breeding aims are to expand the ripening time, to create novel genotypes with early or late ripening time as well as to bred new cultivars with large fruit size, abundant yield, good fruit flesh firmness, good winter and frost hardiness, resistance / tolerance to the most important disease and pests. The costumers prefer cultivars having real apricot flavor.

LRCAF

The main research topics for stone fruits at LRCAF are: variety testing and breeding, management systems, and plant protection. Most important parameters for Lithuanian agro climatic conditions are winter hardiness, resistant to spring frost, late flowering, resistant to main important fungal diseases, and high fruit quality.

In 2017 at gene bank LRCAF has a collection of 80 sweet cherry, 70 sour cherry, 130 plum and 10 apricot varieties and genotypes. These are used for breeding purposes. The evaluation of the stone varieties is conducted according to the Cherry Descriptor List and Plum and Allied Species Descriptor List (International Board for Plant Genetic Resources).

There are some important challenges and gaps for stone fruit growing:

- No large commercial orchards for stone fruit growing (not suitable agroclimatic conditions),
- All stone fruit orchards are planted without plastic covering and tunnels,
- It is an important crop for amateur sector,
- Infestation of plum trees and fruits by Plum pox virus and of sweet and sour cherries by *Monilinia laxa.*

SKST

The cultivation of stone fruits in South Tyrol is quite limited and the growing area only reaches a surface of 159 ha. The prevalent drupes of the region are cherries (85 ha), apricots (67 ha), prunes (3 ha) and peach (4 ha). The farmers cultivating stone fruits are usually doing so as a sideline, next to apples. Most of the stone fruit is cultivated in the Vinschgau Valley (86.3 ha in 2016).

Stone fruits are currently only sold on the local market. The experiences of SKST with stone fruits are quite limited, which might change if the cultivation of supplementing crops to the apple is to augment. Hereafter, a short overview on the stone fruit-growing in South Tyrol is given.

The main stone fruits grown in South Tyrol are cherries and apricots. Regarding cherries, the cultivated varieties in South Tyrol are prevalently Kordia (45%) and Regina (45%). The rootstocks used for cherries are GISELA5 (95%), GISELA6 and PIKU1 (together 5%). Essentially, cherry growing in South Tyrol occurs exclusively with protection against the rain. Additionally, cherries grown on elevations of 800 – 1500 m asl and are harvested in July and August. High elevations work also well for apricots. These fruits grow between 400 – 1100 m asl in the region of South Tyrol and apricots are harvested in July until mid-August. St. Julien A is the main rootstock used with apricots, while the by far most cultivated variety is the local Vinschger Marille (80%).

UHOH

At UHOH (or KOB) no stone fruit varieties are tested.

UNIBO

The sweet cherry breeding program at Unibo has been releasing innovative cultivars that are meeting growers' interest. They are being tested in many sweet cherry growing regions in Europe and the rest of the world, and exclusive rights of cultivation are being negotiated with growers' organizations on a worldwide basis. The major focus is on fruit quality (very sweet, firm, large and dark red), productive, early or late ripening, low in vigour.

Sweet cherry is one of the alternative stone fruit that can be grown in place of peach, which is enduring a loss of profitability that is still decreasing its acreages across the country. This species is enjoying quite some interest by growers in different parts of Italy, that go from the Alps in the North to Apulia in the South. Japanese plums are also very sought after, particularly the black-fruited varieties such as Angeleno. Apricots are also expanding, with the new, later cultivars bringing premium prices to the growers.

Italy has been producing cultivar evaluation lists for all fruit species in a ministry-coordinated effort since 1994. Support to this project has been discontinued for several years now, but the participating institutions are still conducting this work, although the results are made available only every few years, whereas they were released yearly before. This creates a difficulty to the growers who must decide about which varieties to plant. Partial solution to this is the publication via growers' magazines, and also online publication from several websites.

INRA

INRA-Bordeaux started its sweet cherry breeding programme in the 1960's. Since then, several new varieties have been tested in the national variety testing network level 1 and 2. The most known released varieties are Fercer', 'Folfer', but also 'Ferdouce', 'Fermina', 'Fertille', 'Ferdiva' and 'Fertard'. The last variety released from the INRA sweet cherry program was 'Feroni'.

Within the French evaluation network of sweet cherry varieties, the main characteristics which are sought are: early or late ripening, precocity (short juvenile period), productivity (including regularity), homogeneity of production, fruit weight and firmness, good and balanced flavour, tolerance to cracking, tolerance to abiotic (mild winters, summer heat) and biotic (Monilia, bacterial canker) stresses.

The phenotypic evaluation is conducted according to the Cherry Descriptor List, in agreement with UPOV Guidelines. At the Level 1, the following traits are studied: bloom time, flower abundance (scale 1 to 9), ripening date, productivity (scale 1 to 9), fruit weight, fruit firmness, fruit shape, peduncle length, taste, % of cracked fruits, post-harvest behaviour, susceptibility to Monilia. All traits with the exception of fruit weight and firmness, and % of cracked fruits are qualitative and based on the use of different scales.

EUFFRIN MEMBERS

CREA

Peach breeding and varietal testing of novel peach/nectarines and sweet cherry cultivars are important research topics at the Fruit Research Unit of Forlì (CREA-FRF). The new peach/nectarine variety should be consistently productive, tolerant to major diseases, endowed with prolonged on-tree keeping quality with concentrated harvest (few pickings), the fruit being tolerant to disorders and handlings, with good fruit external (large size, well-coloured skin) and internal (high firmness, good taste and flavour) quality. The new sweet cherry varieties should be self-fertile, consistently productive, tolerant to major diseases, the fruit being tolerant to skin cracking, with good fruit external (large size, well-coloured skin) and internal (high firmness, good taste and flavour) quality.

The new cultivars in evaluation at CREA-FRF are organized in 3 trees/cultivar plots (2 trees/plot for sweet cherry) and grafted onto the peach x almond hybrid GF677 (peach cvs.) and Colt (sweet cherry cvs.), respectively. The evaluation is carried out from 3 to 5 years after the first cropping by using 58 (peach) and 35 (sweet cherry) phenological, pomological and agronomic descriptors, mostly UPOV descriptors, based on which the global performance of each cultivar is scored. Quantitative traits are measured or scored according to a 1-9 scale.

At the regional (Emilia-Romagna) level, the testing activity is partly done in networking with the University of Bologna (UNIBO, Partner 20) and CRPV, including the co-organization of fruit exhibitions of the novelties dedicated to farmers and technicians. In the current contest of fast social, political and climatic changes, breeding new varieties being well-adapted to this specific environment and the expert and independent testing of new varieties/rootstocks on the market being more adapted to the different regional/national environments are strategic research activities to promote the peach industry in Italy.

Challenges and gaps peaches

Varietal turn-over in peach is very rapid, and the new releases often planted by growers without proper testing. Adaptability of the new varieties to the environment of introduction can result poor, especially when exacerbated by climatic variability. Higher and higher winter temperatures jeopardize the dormancy completion of cultivars with high chilling requirement and/or anticipate excessively the flowering season, subjecting flowers/fruitlets to low (< 1°C) temperatures. In Emilia-Romagna area, peach blooming occurs 10-14 days before blooming in the years before 1990. Finally, traits such as fruit disorders pre- and post-harvest are becoming more and more important in the assessment of the commercial value of a novel cultivar. Variety pre-evaluation through independent and expert testing is highly valuable for this crop to prevent growers from economic losses.

Challenges and gaps cherries

The cherry industry in Emilia-Romagna region and, in general, in Italy is undergoing a period of constant rise, also thanks to the release of new varieties and the development of planting systems that hasten and optimize the productions. The new releases are often planted by growers without proper testing and might result poorly adapted to the environment of introduction. Higher and higher winter temperatures jeopardize the dormancy completion of cultivars with high chilling requirement. In the last years we experienced a strong increase of Drosophila Suzuki attacks. Variety pre-evaluation through independent and expert testing is highly valuable for this crop to prevent growers from economic losses

Summary for EIP dissemination

Project title: **EUFRUIT: European Fruit Network**

Keywords: **sour cherries, sweet cherries, apricots, peaches and plums**

Summary:

13 of the 18 partners in EUFRUIT-WP2 are member of at least one of the EUFRIN Working Groups for stone fruit species “Apricot and peach”, “Plum and Prune” or “Sweet and Sour Cherry”. From the research institutes only AU and UHOH are not a member of one of these working groups. All partners, except AREFLH, Freshfel and SKST, are variety testers. These EUFRIN Working Groups allow an exchange of information between variety testers, which is very useful to enlarge the knowledge around stone fruit varieties. In contrast to the EUFRIN Working Group “Apple & Pear Variety & Rootstock Testing” these Working Groups have not (yet) a common EUFRIN testing agreement or EUFRIN Descriptor lists.

Most of the partners in EUFRUIT-WP2 focus on 1 or 2 stone fruit species with mostly a small interest in other stone fruit species. The most tested stone fruit species are sweet cherries and peaches. Several participants have or had a breeding program for stone fruit species: NIAB-EMR (sweet cherries and plums), USAMV (sweet cherries), NARIC (sour and sweet cherries), UNIBO (sweet cherries), INRA (sweet cherries) and IRTA (peaches).

Looking at the demands for a new stone fruit variety some are very similar to the criteria for new apple and pear varieties: productivity, fruit size, appearance, fruit quality, storability and or shelf life, … As for new apple and pear varieties also a new stone fruit variety must be less susceptible to pest and diseases. The biggest difference with variety testing of apples and pears is that most participants in EUFRUIT WP 2 are looking for new stone fruit varieties that can extend the season.

Almost all participants are working with 2 levels. In level 1 a limited number of trees is planted in comparison with standard stone fruit varieties. These varieties differ depending on the location. After a few years a selection is made. The best varieties of level 1 are planted in a larger scale on one or sometimes more locations. It is clear that the selected stone fruit varieties for level 2 are not the same in the different institutes or climate zones.

Main challenges and gaps for variety testing of stone fruit species:

1) As for new apple and pear varieties some new cherry varieties are no longer available for all cherry growers, because they are launched as a club variety.
2) Novelties are planted without proper testing. Variety pre-evaluation through independent and expert testing is highly valuable for this crop to prevent growers from economic losses
3) Increasing demands for fruit quality of sweet cherries: firmness, size, freshness, …
4) Increasing demands for residue-free fruits
5) Despite the high number of new peach varieties available for growers, most of them are similar in terms of appearance (but not always in taste), quality and agronomical performance. Therefore this is not a real innovation, confusing sometimes growers and consumers.
6) The main challenge and progress for the future is to develop new varieties of peaches similar in appearance and quality to the available nowadays, but including traits of tolerance/resistance to the main pest and diseases.
7) The majority of stone fruit varieties are imported, but the breeding goals of foreign breeders do not always meet the requirements in other countries/regions.
8) To bring the interests of different stakeholders along the value chain together.
9) Traits such as fruit disorders pre- and post-harvest are becoming more and more important in the assessment of the commercial value of a novel variety.

Main challenges and gaps for growing stone fruit species:

1) Drosophila suzukii has become a major pest in stone fruits. Adequate management of this pest is a big challenge and can cause high costs (eg nets).
2) Other pests and diseases that can be a threat for cherry growing are fruit fly (Ragoletis sp.), cherry leaf spot, Monilia laxa and Pseudomonas.
3) Infestation of plum trees and fruits by Plum pox virus and of sour cherries by Monilinia laxa.
4) In the context of apricots, the European Stone Fruit Yellow (ESFY) poses the major challenge.
5) Climate aspects, especially spring frost that reduce crop loads.
6) Increasing winter temperatures jeopardize the dormancy completion of varieties with high chilling requirement.
7) Many cherry orchards are planted without plastic covering

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Project web page: www.eufrin.org

Annex: Scanning reports

Scanning reports from IEG members EUFRUIT WP2 + CREA-OFA