

Scanning report (EIP format for practice abstracts)

- *Project title (native language):** EUFRUIT - Fruitkennisplatform
***Project title (English):** EUFRUIT: European Fruit Network
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Section A. Summary for EIP dissemination

- *Keywords:** thinning, apple, pear, fruit size, Conference
***Main geographical location:** BE221 (Hasselt), BE223 (Tongeren), BE242 (Leuven), BE236 (Sint-Niklaas)
Other geographical locations:
***Summary (native language):**

Voor de pitfruittelers in België is vruchtdunning een belangrijke activiteit die mee het economisch resultaat bepaalt vermits hogere prijzen worden bekomen voor dikkere vruchten. Alhoewel het de vruchtmaat vergroot en een positief effect heeft op het aantal bloembotten voor het volgend jaar, is het dunnend effect van 6-BA in peer soms te laag. Het kan gecombineerd worden met NAA maar dit kan tot overdunning leiden bij peer. Metamitron aan 165 g a.i./ha (Brevis 1.1 kg/ha) leidt tot een betrouwbare en economisch rendabele dunning met dikkere peren. Maar bewolkte dagen met lage zonnestraling en hoge nacht temperaturen in de perioden voor en na de Brevis toepassing kunnen in een te sterke dunning resulteren evenals het gebruik na strenge vorst tijdens en kort na de bloei.

Ook in appel heeft 6-BA eerder een zwak dunnend effect en een zwak positief effect op de vruchtmaat, maar het stimuleert de bloembotvorming. Het kan eventueel gecombineerd worden met NAA. Voor een matige dunning voldoet éénmaal Brevis aan 1.1 kg/ha. Voor sterke dunning of voor rassen die moeilijk te dunnen zijn is het aangeraden om tweemaal 1.1 kg/ha te gebruiken (eventueel de tweede maal enkel in de kop van de boom) terwijl voor Golden best éénmaal 1.65 kg/ha wordt toegepast. Dezelfde voorzichtigheid als bij peer moet aan de dag gelegd worden met Brevis bij ongunstige omstandigheden van weinig zonnestraling en/of hoge nachttemperaturen of voorafgaandelijke vorstschade tijdens de bloei.

Summary (english):

Fruit thinning is an important activity for pipfruit growers that determines the economic result since higher prices are obtained for larger fruits. Although it increases fruit size and has a positive effect on the number of flower buds for the next season, the thinning effect of 6-BA is sometimes too small. Combination of 6-BA with NAA is possible, but can yield over thinning in pear. Metamitron at 165 g a.i. (Brevis 1.1 kg/ha) results in reliable and profitable thinning and larger pears. However, cloudiness with low radiation and high night temperatures in the days before and after Brevis application can result in too strong thinning as well as the use after strong frost during or shortly after bloom.

Also in apple 6-BA has a rather weak thinning effect and a small positive effect on fruit size, but it stimulates flower bud development. Combination with NAA is possible on apple. Brevis at 1.1 kg/ha suffices for a moderate thinning. For strong thinning or cultivars that are difficult to thin it is best to use 1.1 kg/ha twice (second time can be limited to the top of the trees), while one application at 1.65 kg/ha is advised for 'Golden'. Similar care as with pear should be taken when Brevis is used under bad weather conditions of low radiation and high night temperatures or after frost damage during bloom.

Section B. Project information

- *Project coordinator:** Michelle H. Williams; Aarhus University, Department of Food, Kirstinebjergvej 10, 5792 Aarslev, Denmark; mw@food.au.dk; +45 25170049
***Project period:** 2016 - 2019
***Project status:** Ongoing

***Funded by:** Horizon 2020

***Total budget:** €1.8m

***Geographical 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 (Waremmе-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, NI322 Alkmaar en omgeving, NL338 oost Zuid-Holland, NL33A zuidoost Zuid-Holland, NL341 Zeeuws-Vlaanderen, NL342 overig Zeeland, NI411 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 Hampshire, 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.

Project web page: <http://www.eufrin.org/index.php?id=55>

***Project Objectives (native language):**

1. Oprichting van een Europees kennisnetwerk gericht op de fruitsector.
2. Ontwikkeling en implementatie van een systematische aanpak voor het in kaart brengen en het ontsluiten van wetenschappelijke en praktische kennis.
3. Ontwikkeling van een permanente dialoog met de relevante Europese, nationale en regionale beleidsorganen.
4. Identificatie en ondersteuning van nieuwe prioritaire onderzoeksgebieden door voortdurend bestaande en toekomstige onderzoeks- en innovatieactiviteiten te monitoren en te analyseren.

Project Objectives (English):

1. Establish a European network focused on the fruit sector.
2. Develop and implement a systematic approach for scanning and synthesizing existing scientific and practical knowledge.
3. Establish an ongoing dialogue with relevant EU, national and regional policy bodies.
4. Identify and support new priority areas of research by continually monitoring and analysing existing and upcoming research and innovation activities.

***Project partners:**

1. Aarhus University, Department of Food Science (Denmark) • AU
2. Research Station for Fruit npo (Belgium) • Pcfuit
3. Centre Technique Interprofessionnel des Fruits et Légumes (France) • CTIFL

4. Obstbauversuchsanstalt Jork (Germany) • OVA
5. Stichting Wageningen Research (Netherlands) • WR
6. ~~East Malling Research (United Kingdom) • EMR (terminated 08-02-2016)~~
7. Institut de Recerca i Tecnologia Agroalimentàries (Spain) • IRTA
8. Federal Department of Economic Affairs, Education and Research (EAER), acting through Agroscope Institute of Plant Sciences (Switzerland) • Agroscope
9. Laimburg Research Centre for Agriculture and Forestry (Italy) • Laimburg
10. University of Agronomic Sciences and Veterinary Medicine of Bucharest (Romania) • USAMV
11. National Agricultural Research and Innovation Centre Fruitculture Research Institute (Hungary) • NARIC
12. Lithuanian Research Centre for Agriculture and Forestry (Lithuania) • LRCAF
13. Assemblée des Régions Européennes Fruitières, Légumières et Horticoles (France) • AREFHL
14. Variety Innovation Consortium South Tyrol (Italy) • SKST
15. Freshfel Europe (Belgium) • FRESHFEL
16. Elbe-Obst Erzeugerorganisation r.V. (Germany) • EO
17. Fruitconsult BV (Netherlands) • FC
18. University of Greenwich (United Kingdom) • UoG
19. University of Hohenheim (Germany) • UHOH
20. Università di Bologna (Italy) • UNIBO
21. Institut National de la Recherche Agronomique (France) • INRA
22. NIAB EMR (new 09-02-2016)

Section C. Annex: Scanning report¹

Scanning report 'Fruit Thinning'

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Country: BE

NUTS 3 region(s)²: BE221 (Hasselt), BE223 (Tongeren), BE242 (Leuven), BE236 (Sint-Niklaas)

WP no. and title: WP5 secure sustainable fruit production

Date: 04-05-2017

Source materials and methodology

Pcfruit npo is a research station specialised in fruit growing and encompasses two experimental gardens (pip and stone fruit, strawberry and small fruits), a service division for growers and industry as well as an applied scientific research division all located in one place in Sint-Truiden. The department of pomology within the applied scientific research division is dealing amongst others with sustainable fruit production themes including fruit set and fruit thinning as well as water and nutrient management.

Since more than 20 years this department has been actively involved in the Eufirin Working Group on Fruit Thinning where in the yearly meeting an overview is presented of the fruit thinning research trials. Moreover, several thinning demonstration trials on different apple and pear varieties are executed by the experimental garden pip and stone fruit. The source materials for this scanning report are amongst others:

- Verjans W., Schoofs H., Remy S., Deckers T. 2016. Thinning with Brevis on apple: 2016 results. Oral communication at Eufirin WG Fruit Thinning meeting, Krakau, Poland, 2-4 March, 2017
- Gomand A. 2017. Ervaringen met Brevis op peer in 2016. Fruit 7: 6-8
- Siongers V. 2017. Een terugblik op dunproeven van 2016. Fruit 8: 8-9
- Rosa N., 2016. Comparison between benzyladenine (6-BA) and metamidron as agents for thinning on four apple cultivars. Oral communication at Eufirin WG Fruit Thinning meeting, Porto, Portugal, 3-5 March, 2016
- Verjans W., 2016. Chemical fruit thinning on pear cv. 'Conference'. Oral communication at Eufirin WG Fruit Thinning meeting, Porto, Portugal, 3-5 March, 2016
- Gomand A., 2016. Chemische dunning met Brevis bij peer. Fruitteeltnieuws 07: 4-8
- Gomand A., 2016. Brevis als chemisch dunmiddel bij appel. Fruitteeltnieuws 08: 12-14

Best practice findings

Thinning to optimize the average fruit size and weight is an important activity in Belgian pipfruit production, since the grower receives higher prices for larger fruits. With a continuous growth for the pear cultivar 'Conference' up to 86% of the total pear acreage, thinning research has focused on this cultivar and multiyear trials have been conducted. With 6-BA (150-200 g a.i./ha) at 8-12 mm and min. 18°C thinning is usually not strong enough, but fruit size improvement is good and it has a positive effect on return bloom. A combined application of 6-BA (150-200 g a.i./ha) and NAA (10 g a.i./ha) at 10-12 mm on pear is not suitable as over thinning can occur. The newly registered thinning agent metamidron (165 g a.i./ha or 1.1 kg/ha Brevis) results in reproducible good thinning efficacy with very good fruit size response and a positive economic balance. The dose can be increased to 1.5 kg/ha for older weakly growing trees with many flower buds. A second application at 12-14 mm can result in over thinning and is not advisable. Although metamidron does not require a minimum temperature to be effective, its thinning activity is stronger if high night temperatures and low radiation occur in the days before and following the application. This was shown when Brevis was applied (1.1 kg/ha) at 17/05/2016 leading to 50% less fruits or over thinning, whereas applications at 13 or 24/05/2016 did not cause over thinning. Two days of low radiation and high night temperatures (22-23/05/2016) at the

¹ Equivalent to 'final report' in EIP-AGRI format.

² Please see ec.europa.eu/eurostat/ramon/nomenclatures/ for details on NUTS regions, level 3

time that photosynthesis should recover after the 17 May application explain the over thinning. Providing a general thinning advise is difficult because many parameters like weather conditions (radiation and night temperatures), fruit size at the time of application, fruit set of the previous years and the current year, age of the trees, growth of the trees, flower bud quality need to be considered. However, care should be taken when thinning with Brevis after frost occurred during or shortly after bloom. Thanks to parthenocarp and the use of gibberellins (GA4/7) fruit set in 'Conference' remains mostly at a good level after frost damage, but subsequent thinning with Brevis can result in over thinning since it discards primarily the fruits lacking seeds, which are abundantly present after frost. Since extreme frost from -2 to -5.5°C during more than 7 h in the night of 19 to 20 April 2017 occurred in Belgium pcfuit gives the general advise to the 'Conference', 'Celina' and 'Dicolor' growers to use Brevis (max. 1.1 kg/ha) only if strong thinning is still needed, otherwise 6-BA can be used but hand thinning is probably the safest option this year.

In apple, met amitron twice applied at 8 mm and 12 mm was compared to 6-BA applied once at 8-12 mm for 5 cultivars in 2015. From 22 to 74% of the fruits dropped during June drop using met amitron, while 6-BA resulted in only 2 to 39% of the fruits dropping during June drop. The number of fruits at harvest was significantly reduced by met amitron in 'Gala', 'Red Delicious' and 'Golden Delicious', but 6-BA did not reduce the number of fruits irrespective of the cultivar. The average fruit weight increased in all cultivars (10 to 38 g extra) by thinning with met amitron, whereas with 6-BA no or only a very small increase in average fruit weight was noted. Similarly, grading was positively influenced by met amitron thinning in 'Gala' and 'Red Delicious' with a significant increase in the apples of >70 mm, whereas this was not observed with 6-BA. Hence, when only a limited thinning is required 6-BA can be used eventually together with NAA (0.1 l/ha) but at a temperature of minimum 18°C. For apple cultivars that are easy to thin or when a moderate thinning is needed one application of Brevis (1.1 kg/ha) at 8-12 mm is recommended, while an additional similar dose can be used for cultivars that are more difficult to thin ('Gala', 'Braeburn', 'Belgica', 'Kanzi', 'Pinova'). In 'Golden' pcfuit opts for one Brevis application at 1.1 - 1.5 kg/ha in weakly growing orchards. The importance of the time of Brevis application was also clearly demonstrated in an apple trial in 2016 on 'Golden Delicious' using 1.65 kg Brevis/ha at different time points. Whereas applications up to 19/05/2016 (9 mm) resulted in little to no thinning, the number of fruits per tree was lowered by 50% to 64% and the yield per tree decreased from more than 48 kg in the untreated to 25-33 kg by later applications at 11 to 15 mm fruit size. One period of 2 days (22-23/05/2016) and another of 6 days (29/5-5/06/2016) of low radiation combined with night temperatures of at least 10°C explain these results. Similar findings of over thinning occurred in 'Gala', 'Braeburn', 'Fuji' and 'Pink Lady' upon Brevis application at 25/05/2016. After the abovementioned frost in April 2017 that caused severe frost damage on apple blossoms, pcfuit discourages the use of Brevis on apple in 2017.