The growing technics and mechanisation of the near future!

Spring Future Orchards® Walks
2019
The growing technics and mechanisation of the near future!

Content of today:
1. Introduction
2. Fruit 4.0 project
3. New planting systems and pruning methods
4. New rootstocks
5. Soil moisture measurements
6. Leaf defoliation by leaf blower
**Current situation in Holland**

<table>
<thead>
<tr>
<th>Area (ha)</th>
<th>2000</th>
<th>2005</th>
<th>2010</th>
<th>2015</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apples</td>
<td>12.800</td>
<td>9.700</td>
<td>8.700</td>
<td>7.600</td>
<td>6.600</td>
</tr>
<tr>
<td>Pears</td>
<td>6.000</td>
<td>6.700</td>
<td>8.000</td>
<td>9.200</td>
<td>10.000</td>
</tr>
</tbody>
</table>
## Pear varieties in NL

- Conference (75%)
- Doyenne du Comice (8%)
- Beurré Alexandre Lucas (7%)

**New varieties: (10%)**
- Xenia, Migo
- Sweet Sensation, Gräfin Gepa

### Table of Pear Varieties

<table>
<thead>
<tr>
<th>Variety</th>
<th>Image</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conference</td>
<td><img src="image1" alt="Conference" /></td>
</tr>
<tr>
<td>Doyenne du Comice</td>
<td><img src="image2" alt="Doyenne du Comice" /></td>
</tr>
<tr>
<td>Beurré Alexandre Lucas</td>
<td><img src="image3" alt="Beurré Alexandre Lucas" /></td>
</tr>
<tr>
<td>Xenia</td>
<td><img src="image4" alt="Xenia" /></td>
</tr>
<tr>
<td>Migo</td>
<td><img src="image5" alt="Migo" /></td>
</tr>
<tr>
<td>Gräfin Gepa</td>
<td><img src="image6" alt="Gräfin Gepa" /></td>
</tr>
<tr>
<td>Sweet Sensation</td>
<td><img src="image7" alt="Sweet Sensation" /></td>
</tr>
</tbody>
</table>

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*Image credits: [FRUITCONSULT](https://www.fruitconsult.com)*
Apple varieties in NL

- 44% Elstar
- 22% Jonagold, Jonagored, Jonaprince
- 7% Kanzi
- 6% Junami
- 5% Boskoop
- 4% Golden Delicious
- 12% Others
Introduction Fruitconsult
Introduction Fruitconsult

- Privat consulting and research company
- Apples, pears, cherries and plums

- 10 consultants
  - 7 technical fruit management
  - 3 crop protection

- Main area: Holland + Belgium
  - Around 350 fruit growers
International activities

- Czech Republic
- Denmark
- Finland
- France
- Germany
- Hungary
- Italy
- Norway
- Poland
- Slowakia
- Turkey
- Ukraine
- United Kindom
- Sweden
History

- Since 1998 in Randwijk
- Wageningen University

- General subsidies:
  - paid by fruitgrowers
  - organised by the government

- Fundamental longterm research
  - not practical for the growers
Change since 2014

- General subsidies stopped
- Project subsidies still possible
  - Only possible when research and business work together
- Fruitconsult took over the practical management of the research station
Official new start in 2016

Partnership
In practice:
Research by Wageningen University
Practical field demonstrations by CAF and Fruitconsult

2017: around 80 field demonstrations
2018: around 90 field demonstrations
16 ha - 13 ha now planted

2018: 90 trials en demo’s

- 0.5 ha plume
- 4.0 ha peer
- 8.0 ha apple
- 0.6 ha Cherry
- 0.3 ha Soft fruit
- 0.6 ha Soft fruit

- 2018: 90 trials en demo’s

- 16 ha - 13 ha now planted

- 0.5 ha plume
- 4.0 ha peer
- 8.0 ha apple
- 0.6 ha Cherry
- 0.3 ha Soft fruit
- 0.6 ha Soft fruit
50% is covered by hailnetting
Cherries (0.6ha)

- 50 varieties
- Rootstocks
- Cover systems
- Suzuki fruit fly
- Pruning
- Etc..
Plums (0.5ha)
- 50 varieties
- Rootstocks
- Pruning
- Thinning
- Etc.
New in 2018: 0.3ha soft fruit fields
Research for new varieties with 17 partners
Natyra / Magic Star
Kanzi
Honeycrisp
Wellant
Kizuri
Bonita
Modern equipment which are equal to orchard sprayers
- stay as close to practise as possible -
Emmisionfield (large borders)
2019

4 partners
100 sponsors
530 supporters
3000 visitors
Welcome to the openday:
20th of August 2020
The growing technics and mechanisation of the near future!

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Spring Future Orchards® Walks
2019
Examples of last 20 years

- Scab
- Coddling moth
- Nectria stempylium
- ... 

- Fruit set
- Fruit thinning
- ... 

- Frost
- Growth
- Fruit size
- ...
Collaboration between research and practice
Target: What is possible with existing technics in fruit growing?

- Sensor technics
- Tracking and tracing in the orchard (GPS)
- Drone technics
- Soil scan
Ideas within Fruit 4.0

• Step 1: Gather the correct and interesting orchard data
  => flower-intensity, growing level, cropload, soil data, etc..

• Step 2: Use the information in practice
  => Spotwise crop protection, fertilizing, root pruning, chemical thinning etc..

• Step 3: Picking robot and pruning robot
What is possible with sensors and camera's??

Test platform with camera's and sensors
Fruit 4.0: camera- en sensorbeelden

Rometron

De Rometron sensor meet de aanwezigheid hoefstof bedgroen, die in verhouding staat met de hoeveelheid bladmest. De schaal is van zwart (geen bedgroen) naar groen (met bedgroen). Hoe groter het beeld, hoe meer bedgroen. Dit is een hoed van 1,5 meter radius en elk blokje is 50 cm hoog.
- Op 2 mei zijn de bomen nog nauwelijks bedgroen.
- Op 29 juli zijn al veel duidelijker groene vlekken waargenomen.
- Op 3 juli is er meer blad weermarmoedig dan bij de voorgaande meting.

Laserscanner

De laserscanner meet de afstand van de scanner tot het dichtstbijzijnde object. Zo ontstaat een 3D-beeld van de boom en een maat voor de inzoom van de boomkruid. In de afbeeldingen is de achtergrond donker blauw, terwijl de kleurintensiteit van het groen de afstand weergeeft. Op alle beelden zijn duidelijke vormen van de boom waargenomen. De beelden in de rij geraken een onderscheid in groen van de bedgroei duidelijk.

Kinect camera

De Kinect camera werkt met RGB (rood-groen-blauw)-opnamen gemakkelijk van de bomen. Hieruit worden de boomhelften en de apenvariaties met op een grote groothoek.
Observing flowers

Foto’s Patricia Hoogervorst en Nico Bondt
Observing flowers

• 80 % reliable (2018)

• Information for thinning sprays
• ATS, Ethrel, BA, NAA, Brevis etc.
Observing fruits

• Information for thinning sprays
• ATS, Ethrel, BA, NAA, Brevis etc..

• Information for hand thinning

• Information for harvest prediction
Observing fruits
Problems in the project

- Trees are too wide (depth measurement is not easy)
- Branches hang together
- Sunlight gives problems with observing white flowers
Is it possible to change tree shape? From 3D systems to 2D systems?

Research on Proeftuin Randwijk
2D systems
Observing the harvest

How can we improve tracking and tracing in the orchard?

Foto’s Patricia Hoogervorst
Observing the harvest

GPS module and marking boxes during picking

Foto’s Patricia Hoogervorst
Tracking and tracing on the sorting line
The marked boxes are sorted

Provides information about quantity and quality in the orchard

Gives information on where most rot occurred in the orchard
• Fruits per meter
• Fruit size
• % blush
• % storage rot
What is possible with drone technics?
Drone technics the focus on:

- Root pruning on GPS, 2017-2020 (WUR)
- Fertilization on GPS, 2019-2022 (WUR)
- Tracking fire blide (PCF)
2017-2019

Root pruning on GPS

Based on task maps

Based on drone recordings

Client: Fruit4.0
Date: 20181010
Location: Sander de Vree

schematics, cired (p75)
Root pruner with GPS box

Tractor with GPS box

The depth of the knife can is 100% variable
Soil scan

pH measurements

EC measurements
• 0-30cm
• 0-90cm
Soil scan

Based on the results:
• 4 soil analysis
Soil Scan

4 soil analysis per orchard
**Example of soil analysis**

<table>
<thead>
<tr>
<th>Bio Randwijk</th>
<th>Grass alley</th>
<th>Black stripe</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>6.3</td>
<td>6.5</td>
</tr>
<tr>
<td>N-supplying capacity</td>
<td>84</td>
<td>88</td>
</tr>
<tr>
<td>Organic matter</td>
<td>3.0%</td>
<td>3.3%</td>
</tr>
<tr>
<td>Lutum</td>
<td>18%</td>
<td>18%</td>
</tr>
<tr>
<td>CEC</td>
<td>156</td>
<td>159</td>
</tr>
<tr>
<td>CA-CEC (%)</td>
<td>83.3%</td>
<td>80.0%</td>
</tr>
<tr>
<td>Mg-CEC (%)</td>
<td>14.0%</td>
<td>14.8%</td>
</tr>
<tr>
<td>K-CEC (%)</td>
<td>2.7%</td>
<td>4.4%</td>
</tr>
</tbody>
</table>

![Cation Exchange Capacity (CEC)](image)
% Organic matter

% Lutum
CEC

Idea:
Combined with drone or sensor technics fertilization spotwise on GPS

Examples:
Organic matter, Nitrogen, Lime, Gypsum
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New planting systems and pruning methods
Pruning evaluates all the time.....

- New planting systems
  - More volume => quicker in production
  - Short planting distances => higher investments per ha
  - New planting systems => more branches per meter
    + Quicker in production
    + Trees are expensive, however less needed per ha
    - Only successful with high quality trees
- Pruning concentrated on short vital wood
Trees with 2 leaders
Double Guyot-system with many upgrowing branches
Planting distance (IT): 2-2.5m x 1.5m
Fuji 13 years

Pink 12 years

Pink 12 years

Foto’s Peter Matha
Research on Proeftuin Randwijk
2D systems

Is it possible to change tree shape?
From 3D systems to 2D systems?

Planting date: May 2018

- 1 leader (run through tree)
- 2 leaders
- 3 leaders
- 4 leaders
- 6 leaders
- Multiple leader

Pruning trial
Bi-Baum

Single Guyot

Proeftuin
Randwijk
Winter 2019

Double Guyot
Proeftuin Randwijk Winter 2019

Planting date: May 2018

Planting distance:
3 x 1,60m (2080 trees/ha)

Trials:
• 4 leaders
• 6 leaders
• Multiple leader

Pruning trial

Double Guyot
Fruits per tree: 85
Kg per tree: 14,6 kg
Ton per ha: 30,4 ton
Fruit weight: 171 gr
Proeftuin Randwijk Winter 2019

Planting date: May 2018

Planting distance:  
3 x 1,14m (2920 trees/ha)

Pruning trial
Fruits per tree: 51
Kg per tree: 10,6 kg
Ton per ha: 31,0
Fruit weight (gr): 207gr
Growing apples and pears like a fruit wall (2D-system)

• Easy to prune, thin and pick
• High yields
• Homogeen quality (lot of light)
• More possibilities with new technics (Camera‘s, sensors etc.)

Foto’s: WUR
Pruning evaluates all the time..

- Because of higher productions, the growth is decreasing
- Thick wood with growth will be removed every year (less reaction)
Hanging wood gives more problems with quality and biannual bearing
Weak wood gives smaller and shorter fruits
Especially in the middle of the trees the wood is weak.
Especially in the middle of the trees the wood is weak
Conclusion for pruning

Horizontal vital wood gives quality
Pruning: What are we still doing?

- Slender table branches with click pruning
- Limit the height of the tops
Pruning just planted trees
Do not remove feathers!

No reaction

More thickening
Pruning just planted trees!

29 May 2009  14 July 2009  After pruning 18 March 2010
Research to prevent blindwood on feathers and trunk

• Variety Wellant
• By hand and with copper removing the leaves in the nursery
• Timing:
  • Beginning October 2017
  • Half November 2017
Defoliated: Oktober 2017
Defoliated: November 2017

Reduce blindwood by breaking the trunk
Reduce blindwood on the feathers

- Differences between varieties
- The early copperchelate spray created more blindwood
- The late defoliation gives less blind wood
Reduce blindwood on the feathers

Always cut the feathers back!

- Gives less blind wood
- To limit the length
Pruning in the 2nd year
When necessary take out a thick branche
Pruning demo Kizuri 2019

Everything left

Taken out weak wood
Pruning demo Kizuri 2019

No cut on the end

> 10 cm cut on the end
How to prune the tops?

• Remove some competitors
• Save some shoots with end flower

• Leave the others:
  • All of them?
  • Remove some on stump?
  • Or remove some on the end flower?
Long (end flower)

- Hanging wood
- Blind wood
- No (few) flowerbuds
Tops with cut
• stable wood
• More flowerbuds
• Shorter wood

Branches are up growing
Golden Delicious (Sud Tirol)

Growth on the end of the branch
More fruit set on the 1-year old wood of Jonagold
Cut and click on Conference
How deep do we need to cut?

Apple
- Thicker shoots =>
  - long or remove on stump
- Thin shoots =>
  - Cut on the end

Pear
- Remove the end flower at Conference
- Cut back stronger in Lukas or Xenia (flowerbuds)
Pruning:

A continuous development!
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Developments in Rootstocks of apples

Jan Peeters
Fruitconsult
Apple – current situation in Europe

- 90% = M9 T337
  ⇒ Little bit: Fleuren56 (= -15% growth) and Nic29 (= + 20% growth)

- 90-95% is replanted soil
  - Fresh soil 9-11 kg ⇒ quickly full production
  - In perfect situation:
    - Potting soil, fertigation, planting in may etc..
    - 80-85% of fresh soil
    - In most situations 60-70%
### Apples – current situation

**Example (3,25 x 1 meter):**

<table>
<thead>
<tr>
<th></th>
<th>20th year</th>
<th>30th year</th>
<th>40th year</th>
<th>50th year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh</td>
<td>10 kg</td>
<td>15 kg</td>
<td>18 kg</td>
<td>18 kg</td>
</tr>
<tr>
<td>Replanted good</td>
<td>7 kg</td>
<td>12 kg</td>
<td>16 kg</td>
<td>18 kg</td>
</tr>
<tr>
<td>Replanted ‘normal’</td>
<td>5 kg</td>
<td>9 kg</td>
<td>12 kg</td>
<td>15 kg</td>
</tr>
</tbody>
</table>

**Difference:**

<table>
<thead>
<tr>
<th></th>
<th>€0,35/kg*</th>
<th>€0,55/kg*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh &lt;-&gt; Repl. good = 8 kg/tree</td>
<td>€2,80/tree</td>
<td>€4,40/tree</td>
</tr>
<tr>
<td>Fresh &lt;-&gt; Repl. norm = 20 kg/tree</td>
<td>€7,00/tree</td>
<td>€11,00/tree</td>
</tr>
</tbody>
</table>

*= nett price per kg minus harvest costs
Apples – current situation

Others:

• Use of potting soil
  • Problem with mice
  • Start is better, however the growth can be more difficult
  • Extra costs

• M9 problems with: Neonectria, root fields, woolly aphids, Erwinia

• However: M9 is still the best choice!!
Alternatives

• Frank Maas: PPO research 2009 till 2012.
• Elstar with:
  – Geneva rootstocks -> G11 and G41.
  – Skierniewice rootstocks -> P59, P60, P66 en P67
Alternatives

• Results Frank Maas:
  • The productions of G11, G41, P59, P60 and P67 were comparable with M9
  • G11 en G41 no root fields
  • G11 en G41 little higher fruit weight.
  • G41 better coloration compared to M9
  • Perspectives out of literature of G41: toleration for replanting deseases, resistance against Erwinia, Phytophtora, winter hardness is good, no rooting fields
  • The recommendation in 2013: ‘G41 deserves more research’
Released Geneva® Apple Rootstocks
Arranged by Tree Size

- M.27
  - G.65
  - G.41
  - G.11
  - G.16

- M.9
  - G.202
  - G.935

- M.26 Size
  - G.30

- M.7-MM106 Size
  - Seedling

(M.27, M.9, M.26, M.7-MM106 refer to rootstock sizes; G.65, G.41, G.11, G.16, G.202, G.935, G.30 refer to specific rootstock varieties.)
THE “DIRTY” FIVE

- **Rhizoctonia** mycelium
- **Pratylenchus penetrans** spores
- **Phytophthora** spores
- **Pythium atrantheridium**
- **Cylindrocarpon** spores
# Chelan Replant Location Organic Management

## Mean Cumulative Yield of Highest and Lowest Three Rootstocks

<table>
<thead>
<tr>
<th>Rootstock</th>
<th>No FUM</th>
<th>FUM IG</th>
<th>Supp. 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.9</td>
<td>G.41</td>
<td>G.16</td>
<td>G.93</td>
</tr>
<tr>
<td>M.26</td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Nic.2</td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supp.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Highest Three
- G.93
- G.41
- G.16

### Lowest Three
- B.9
- M.26
- Nic.2

**Mean Cumulative Yield**
- Highest Three: 9.6%
- Lowest Three: 60%

**Note:**
- 'Supp.' likely refers to a supplemental or support rootstock treatment.
Research in: Klein-Altendorf, Laimburg, Bologna

Planting date: Mai 2013

Variety: Gala `Buckeye Simmons´

Rootstocks: M9, CG11, CG41, B9, B491, AR295/1
% of fruit set compared with M9 at untreated soil in Juli 2014 and Juli 2015

- G41 and G11 better fruitlet compared to M9.
- No biannual bearing
- B9 en B491 more biannual bearing
% of growth compared to M9 over the years 2013, 2014 en 2015

- CG 41, CG11 less effected at replanted soil
| Characteristics |

<table>
<thead>
<tr>
<th>Merkmal</th>
<th>M9</th>
<th>CG11</th>
<th>CG16</th>
<th>CG41</th>
<th>CG202</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kreuzung aus</td>
<td>Zufalls-</td>
<td>M26 x</td>
<td>Ottawa3 x Malus</td>
<td>M27 x</td>
<td>M27 x</td>
</tr>
<tr>
<td></td>
<td>sämling</td>
<td>Robusta5</td>
<td>floribunda</td>
<td>Robusta5</td>
<td>Robusta5</td>
</tr>
<tr>
<td>Wuchs</td>
<td>Schwach</td>
<td>Schwach</td>
<td>Schwach</td>
<td>Schwach</td>
<td>Schwach</td>
</tr>
<tr>
<td></td>
<td>(Standard)</td>
<td>10-20% &gt; M9</td>
<td>20% &gt; M9</td>
<td>&gt; 25% &gt; M9</td>
<td>10-20% &gt; M9</td>
</tr>
<tr>
<td>Ertragsverhalten</td>
<td>Standard</td>
<td>Wie M26</td>
<td>Wie M9</td>
<td>&gt; M9</td>
<td>Wie M26</td>
</tr>
<tr>
<td>Verhalten gegenüber</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Blutlaus</td>
<td>Anfällig</td>
<td>Mäßig anfällig</td>
<td>Tolerant</td>
<td>Tolerant</td>
<td>Tolerant</td>
</tr>
<tr>
<td>• Feuerbrand</td>
<td>Anfällig</td>
<td>Mäßig anfällig</td>
<td>Tolerant</td>
<td>Tolerant</td>
<td>Tolerant</td>
</tr>
<tr>
<td>• Frost</td>
<td>Anfällig</td>
<td>Tolerant</td>
<td>Tolerant</td>
<td>Tolerant</td>
<td>Tolerant</td>
</tr>
<tr>
<td>• Krebs</td>
<td>Anfällig</td>
<td>Tolerant</td>
<td>Tolerant</td>
<td>Tolerant</td>
<td>Tolerant</td>
</tr>
<tr>
<td>• Nachbaukrankheit</td>
<td>Sehr Anfällig</td>
<td>Tolerant</td>
<td>Tolerant</td>
<td>Tolerant</td>
<td>Tolerant</td>
</tr>
<tr>
<td>• Phytophthora</td>
<td>Anfällig</td>
<td>Mäßig anfällig</td>
<td>Tolerant</td>
<td>Tolerant</td>
<td>Tolerant</td>
</tr>
<tr>
<td>• Triebsucht</td>
<td>Anfällig?</td>
<td>Tolerant</td>
<td>Tolerant</td>
<td>Tolerant</td>
<td>Tolerant</td>
</tr>
<tr>
<td>Wurzelschosser</td>
<td>Klonabh.</td>
<td>Keine, aber seif.</td>
<td>Wenige</td>
<td>Keine</td>
<td></td>
</tr>
<tr>
<td>Luftwurzeln</td>
<td>Klonabh.</td>
<td>Wenige</td>
<td>Wenige</td>
<td>?</td>
<td>?</td>
</tr>
</tbody>
</table>
Apples – rootstocks with opportunities

- B9
  - Weaker compared to M9, sensitive for replanted soil. Winter hardness is really good.
- G11
  - Stronger compared to M9, comparable productions. Several resistances and tolerances.
  - More sensitive for replanting compared to G41? Less root fields
- G16
  - Sensitive for several viruses. Less sensitive for replanting. Less root fields.
- G41
  - Comparable with Nic29. Productions higher compared to M9. A lot of resistances and tolerances.
Apples – rootstocks with opportunities

- Next 5-10 years M9 Standard.
  - USA will plant Geneva more rootstocks
  - In the Netherlands productions by Janssen and sub licence by Hillebrand and van Diepen nurseries.

- A lot of research in Europe, research in Holland since 2017
  - 2017 Rootstock trial in Magic Star (SQ159)
  - 2018 Rootstock trial in Elstar
Apples – rootstocks with opportunities

• Proeftuin Randwijk:
  – In 2016 G11 and G16 at Natyra
  – In 2017 new rootstock trial

• Future:
  – Over 5 years M9 not always the best and normal choice anymore.
  – Especially for varieties like Kanzi, Junami and Gala this will go quickly
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Soil moisture measurements

Current situation:
- Auger
- Watermarks (kPa)
New type of measurement

Watermarks (kPa)

- Benefit
  1. Cheap
  2. Ground type independent
  3. Lots of experience with it

- Disadvantage
  1. Responds slowly to change
  2. Temp. dependent

Volume measurements (% moisture in the soil)

- Benefit
  1. Responds quickly to changes
  2. Option EC measurement and soil temp. (Very expensive)

- Disadvantage
  1. More expensive
  2. Soil type dependent (calibration)
Water Holding Capacity By Soil Type

Source: New Mexico State University Climate Center
http://weather.nmsu.edu/models/irrsch/soiltype.html

**Legend:**
- **Field Capacity:** Maximum % of water soil can hold.
- **Permanant Wiltting Point:** Water contents less than this will lead to permanent damage.
What’s available

Weatherstation with watermarks as option

• Wolky tolky (Dutch)
• Davis (USA)
What’s available

Wired loggers
• Challenge agriculture
• Metis (estede)
What’s available

Fertigation unit

• VGB
What’s available

Wireless

- Soil mate
- Beacon fields
- Geobas
The growing technics and mechanisation of the near future!

Content of today:
1. Introduction
2. Fruit 4.0 project
3. New planting systems and pruning methods
4. New rootstocks
5. Soil moisture measurements
6. Leaf defoliation by leaf blower
The growing technics and mechanisation of the near future!

Spring Future Orchards® Walks
2019
More first pick, with the leaf blower
Red Pulse
Fruittec (Germany)
More first pick, with the leaf blower Olmi (Italy)
Technical details

- Speed 2 km/h
- 0,5-0,75 bar
- 80 PK
- 140-135 rotations

- Price machine: €20.000-€40.000
Demo 2018 Elrosa Proeftuin Randwijk

Untreated

Firmness: 6,3
Sugar: 13,7
Starch: 5,8

Leaf blower, before 2\textsuperscript{nd} pick

Firmness: 5,9
Sugar: 13,1
Starch: 6,1
More first pick, with the leaf blower

Experiences 2018 and 2019 in Holland
• Growers are positive in general
• Mostly tested on Kanzi and Maribelle
• 7-10 days before the first pick looks ideal
  ➢ 3 weeks before picking is too early
• After 1st pick also results, however not so heavy
• Vital, stiff wood works better, compared to hanging wood

Points of attention
• Firmness: 0,4kg lower in Elstar demo Randwijk
• Flowerbud formation: not enough experience yet
The growing technics and mechanisation of the near future!

Spring Future Orchards® Walks 2019

Thanks you for your attention!!