New training systems to improve the profitability of cherry orchards

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New training systems: Why?

- Earlier full Bearing
- Reduce labour costs
- New varieties available
- New rootstocks available
- Protect the trees from rain and insects
- No universal training system
Training system : choice of the varieties

* Vegetative habit of the varieties
  * Vigour : medium (Regina), strong (Ferdiva)
  * Growth habit : upright, semi-spreading, spreading, willowy
* Ramification
  o Intensity
  o Crotch angle
* Axis and fruiting wall : select varieties with spreading habit with a good ramification and wide crotch angle (Regina, Rubin, Ferdiva, Ferdouce) avoid varieties with upright growth and poor ramification (Summit, Satin®, Lapins, ...)
* to improve the ramification it may be possible to spray plant growth regulator like promalin (if this product is allowed)

* Production
  * First fruit set
  * Full bearing
    o Level
    o Regularity
**Rootstock**

* Dwarfing:
  * Gisela 5 < Tabel® < Piku 1

* Semi-dwarfing
  - Weiroot 158 < Gisela 6 < Furtos = PHL-A < Maxma 14 = Krymsk 5

* Vigourous
  - SL 64 = Maxma 60 = GF 8,1/Adara < Mazzard = Piku 3

**Growth habit**

* Upright: Furtos, PHL-A
* Spreading: Gisela 6, Gisela 12, Weiroot 158

**Soil**

- Fertility
- Calcareous: very sensitive: Tabel
- Waterlogging: very sensitive: SL 64, Weiroot 158
- Water stress
Training system and protection from rain and insects

Fully protected orchard

Row-by-row protection from rain and insects
Training system: axis

Axis: Balrine*/ Piku 1*, 3rd leaf
4 m x 1.5 m (1666 trees/ha)

Axis: Balrine*/ Tabel®*, 9th leaf
4 m x 1.5 m (1666 trees/ha)
Training system: bi-axis

Bi-axis not well-balanced, Bellise-Gisela 6, 18 April 2nd leaf-13

Most vigorous one: put it with an angle
Less vigorous one: put it vertically

Bi-axis well-balanced, Bellise-Gisela 6, 18 April 2nd leaf-13
Training system: palmette

Balrine*/ Gisela 6*, early 4th leaf

Early Red*/ Gisela 6*, early 4th leaf

Rosie*/ Maxma 14* : end of 5th leaf

Distances : 4,5 m x 3 m
Height : 2,70 m
Training system: palmette

Early Red*/ Gisela 6*, early 4<sup>th</sup> leaf

Rosie*/ Maxma 14*, early 6<sup>th</sup> leaf

Babelle*/ Gisela 6*, early 4<sup>th</sup> leaf

Burlat/ Gisela 6*, early 4<sup>th</sup> leaf
Training system: palmette

Rainier/Gisela 6*, early 6th leaf

Summit/PHL-A*, early 4th leaf
Fruiting wall

Regina/ Tabel®, harvest from the ground (without a ladder)

Regina/ Maxma 14 in axis : 2.50 m within the row , height : 3.70-4.0 m – harvest with a picking platform
Fruiting wall: trials in progress

La Tapy 2005
Variety: Folfer*
Rootstocks: Tabel®, Maxma 14*

Ctifl 2009
Varieties: Bellise®, Folfer*
Rootstock: Gisela 6*

Ctifl 2011
Varieties: Bellise®, Folfer
Rootstocks: Gisela 6*, Weiroot 158*

La Tapy 2013
Variety: Regina
Rootstock: Gisela 6*
Choice of the varieties

Very productive varieties
Good ramification and spreading to willowy growth habit
Good results with: Bellise®, Ferdouce*, Folfer*, Hedelfingen, Regina, Rubin, Staccato®*
Medium results: Belge-Ferrovia, Kordia
Bad results: Fertard*

Choice of the rootstocks

Productive and very productive
Dependant on soil fertility
Vigour of the variety
Shape of the trees (axis, biaxis, palmette)
Good results: Tabel® with fertile soils, Maxma 14 with medium soil, Gisela 6* depends on soil, climate and variety.
Two errors to avoid: not enough or too much vigour

Not enough vigour
No pruning during growth
Pruning in winter

Too much vigour
Mechanical pruning during growth just before harvest
Manual pruning to allow the light go through the hedge
Notching on trunk during flowering
Cutting the roots, only one side of the row the same year
Paclobutrazol if allowed
**Ctifl Balandran** (Nîmes)

2011
- Varieties: Grace Star, Belge, Ferdiva
  - Rootstocks: Maxma 14, Krysmk 5, Krymsk 7

2014
- Varieties: Folfer, Ferdiva, Regina
  - Rootstocks: Piku 1, Weiroot 158, Furtos, Maxma 14, Maxma 60, SL 64

2015
- Variety: Burlat
  - Rootstocks: Piku 1, Weiroot 158, Furtos, Maxma 14, Maxma 60, SL 64

**La Tapy** (Carpentras)

2012
- Six different training systems (including KGB with Regina on Maxma 60)
Grace Star/ MM14 : 1st leaf, 12 July, 2 months after pruning the limbs at 10-15 cm

Grace Star/ MM14 : early 3rd leaf, Full bearing expected in 2015 (5th leaf) or 2016 (6th leaf)
Belge/ Maxma 14: full bloom early 4th leaf

Grace Star/ MM 14, Krymsk 5 and 7: August 4th leaf after pruning uprights at 2.7 m
Choice of the variety

- **Productive** (it’s less important than for fruiting wall)
  - but able to produce on uprights

- **Upright and semi-spreading habit** and few or average ramification

For example: Sabrina®, Folfer, Satin®, Summit, Lapins, Sweetheart®, Staccato®

Varieties with semi-spreading, spreading habit with good ramification:
- Ferdouce, Ferdiva, Regina, Rubin: these varieties will need more labour (removing laterals) and some difficulties to obtain enough uprights
Choice of the rootstocks

Depend on varieties and soil fertility
Dwarfing : Piku 1
Semi-vigorous, vigourous
- Weiroot 158, Gisela 6, Gisela 12, PHL-A, Furtos, Maxma 14, Maxma 60, SL 64 ?, GF 8,1-Adara ?, Monrepos ?

Planting distances

- Dwarfing : 3.5 m x 2 m
- Semi-dwarfing : 3.5 m to 4 m x 2 m
- Vigorous : 4 m x 2 m to 2.5 m
Important points to note
To control vigour and uprights growth
- Pruning the first 2 years: **No less than 3 prunings the 1\textsuperscript{st} and 2\textsuperscript{nd} leaf**
  - 1\textsuperscript{st} leaf: (prune the trees at 60 cm from the ground)
    - first pruning: in may-june
  - 2\textsuperscript{nd} leaf:
    - second pruning: in winter
    - third pruning: in may-june

It’s important to **obtain at least 25 uprights**, more if the rootstock is vigourous. **Don’t hesitate to remove the most vigourous uprights**
- Choose the right density
The UFO system
Upright fruiting offshoot

Trial in progress at Balandran
Objectives:
- feasibility with Maxma 14, the most common rootstock used in France
- study varieties with different vegetative characteristics (vigour, growth habit, ramification, ...)

Year of planting: 2014
• Rootstock: Maxma 14
• Varieties
  • Early: Burlat
  • Mid-Early: Early Star®, Folfer, Ferdouce
  • Mid-Season: Samba®, Satin®, Summit, Van, Rainier
  • Mid-late: Kordia, Belge, Lapins
  • Late: Skeena, Rubin, Ferdiva, Regina
• Distances: 3.5 m x 2 m (1428 trees/ha)
• Angle 30° from soil
• Uprights every 15-20 cm
The UFO system

UFO : Samba®*/ Maxma 14*, early 1st leaf

UFO : Lapins/ Maxma 14*, early 1st leaf
Cherry varieties and rootstocks information on the Ctifl web site

http://www.ctifl.fr/Pages/EspacePro/DetailApplication.aspx?id=172

After registration, free access
Projects 2015-2016

2015: survey on training system trials carried out by the COST cherry partners

Objectives: knowledge of the trials in progress or recently finished, be able to use the results of these trials, contact concerned people

Create a database
The way to achieve this: choice of the best way to collect the informations
- Excel
- Software R
- Software Sphinx
- Software Agrosyst
- Other softwares

2016: training course at Ctifl Balandran in February
Subject: training systems and rootstocks
Thank you for your attention