Pear breeding programmes
Variety & rootstock

INRA IRHS
CEP INNOVATION sarl

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Summary

• State of the art
• Description of the breeding programmes
  – Varieties
  – Rootstock
• Identification of genitors
• Released cultivars
• Some propositions
State of the art of pear breeding

- Most of the pear varieties are susceptible to the main diseases and pests

- Creation of new varieties is a long process, time-consuming, expensive, mostly empirical
Which **requirements** the breeders have to face to?

- **For the fruit growers:** regular bearing, high productivity, less chemical spraying, less manual thinning and pruning…

- **For the marketers:** fruit attractiveness, fruit size regularity, good shelf-life, shape of the fruit, length of the stalk…
Which **requirements** the breeders have to face to?

- **For the consumer:** taste and attractiveness, shelf-life at home, less residues… mineral elements and vitamins…

- **For the environment:** minimize the impact of fruit production on water and atmosphere, greenhouse gas emissions…
Pear varieties: Scientific Objectives

2 objectives:

– create new varieties productivity and regular bearing carrying sustainable resistance genes to diseases and pest, with a high level of fruit quality,

– Enhancing the efficiency of the breeding scheme

Partnership between public research and private company
Crosses 6 to 15 / year

Sowing 4000 seeds / year

Selected plants

Selected trees

Selection on architecture, juvenility, vigor, powdery mildew

Plantation in nursery

Scab selection for some progenies

Sowing under glasshouse

Plantation in hybrid orchards

Level I
3 grafted trees in 3 sites

Level II
>15 grafted trees in 10 sites

Selection / 23 criteria / 8 years

Plantation in 2 private sites + INRA

No grafting 1000 hybrids / year

8 years

3 years

Pear varieties: Breeding scheme
Since 1984

<table>
<thead>
<tr>
<th></th>
<th>Prebreeding programme: Resistance to diseases and pests</th>
<th>Breeding programme: Quality/tardivity</th>
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<tbody>
<tr>
<td>Crosses</td>
<td>38</td>
<td>86</td>
</tr>
<tr>
<td>Seeds</td>
<td>31000</td>
<td>82000</td>
</tr>
<tr>
<td>Trees planted in orchards</td>
<td>2200</td>
<td>7000</td>
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Pear varieties: 2 Breeding programmes
**Rootstock programme: Breeding programme**

**General criteria:**
- Propagation ability
- Compatibility
- Resistance to fire blight

**2 axis**

**Northern Europ:**
- Low conferred vigor

**Southern Europ:**
- Tolerance to ferric chlorosis
- Tolerance to drought

**Collaboration with IRTA**
Identification of genitors

- Identification (and building) of progenitors (sources of multiple resistances to diseases and pests)
- Utilization of the molecular biology tools
Scab test

• **Conditions of experimentation under glasshouse**
  – Grafting material
  – 18°C, 80 % RH, shadow if necessary

• **Preparation of the inoculum**
  – inoculum prepared from scabed leaves
  – Evaluation of the concentration (Mallassez cell)
  – Inoculation by spray
  – Cover during 72 hours (100% RH)

• **Lecture**
  15 to 20 days after inoculation
Fire blight test

Fire blight inoculation by cutting leaves with scissors and a suspension of bacteria

Lecture
15 to 20 days after inoculation
Psylla evaluation

• Identification of sources of resistance to psylla
Aim

Building of progenitors pyramiding resistances to psylla, fire blight and scab
Some cultivars

Angelys

- Harvest by the end of september
- Homogeneous maturity
- Regular globulous and pyriform shape, bronzed with a light red blush on the sunny face
- Fine and juicy flesh, sweet with very pronounced floral aromas
- Susceptible to scab and fire blight.
Cepuna Migo®

- Harvest by the beginning of September
- Homogeneous maturity
- Regular pyriform shape, yellowish-green with some light russet, light red blush on the sunny face
- Half-fine juicy flesh, sweet with light aromas
- Susceptible to scab, partially resistant to fire blight.
Some cultivars

P3123

- Harvest by the beginning of September
- Homogeneous maturity
- Regular pyriform shape, yellowish-green with light russet, light red blush on the sunny face
- Very fine and juicy flesh, sweet with pronounced floral aromas
- Partially resistant to psylla.
- Harvest mid-september
- Homogeneous maturity
- Vigorous tree, medium productivity
- Regular pyriform truncated cone shape, 100% coppered skin, smooth and silky skin
- Very fine dense and juicy flesh, very sweet with aromas of candied fruits
Thanks for your attention