USE OF GRAFTED CUCURBITS IN THE MEDITERRANEAN REGION AS AN ALTERNATIVE TO METHYL BROMIDE

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Several species of the same family (Cucurbitaceae) can be used as rootstock. This should:

- Be resistant to the disease that is being used to prevent
- Have a good compatibility with scion
- Give vigour and strength
- Possess good conditions for the grafting to be carried out
- Not modify fruit quality unfavourably
## Rootstocks

- **Species that are used as rootstocks in cucurbitaceae**

<table>
<thead>
<tr>
<th></th>
<th>Melon</th>
<th>Cucumber</th>
<th>Watermelon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cucumis melo</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Citrullus lanatus</td>
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<td>+</td>
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<tr>
<td>Cucur.moschata</td>
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<td>+</td>
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<tr>
<td>Cucur.ficifolia</td>
<td></td>
<td>+</td>
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<tr>
<td>C.max x C.mosch.</td>
<td>+</td>
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<tr>
<td>Lagenar. siceraria</td>
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<td>+</td>
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<tr>
<td>Benincasa cerifera</td>
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Grafting methods

- **Tongue approach**
- During the union phase the two plants (rootstock and scion) conserve their root systems
Grafting methods

- Insertion grafting
  - Once joined, the union is stronger.
  - There is no need to cut the stem of the scion
Grafting methods

• Splice grafting
  • It has the same advantages as the “insertion grafting”
  • It seems more easily automated
**Grafting methods**

- Grafting is carried out in specialized nurseries, by trained personnel.

- Now they are beginning to use robots that improve labour efficiency
Pathogens controlled by grafting

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Melon</th>
<th>Cucumb</th>
<th>Watermelon</th>
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<tbody>
<tr>
<td>F. oxysp. melonis</td>
<td>+</td>
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<tr>
<td>F. oxysp. niveum</td>
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<tr>
<td>F. oxysp. cucumerinum</td>
<td></td>
<td>+</td>
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<tr>
<td>Phomopsis sclerotioides</td>
<td></td>
<td>+</td>
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<tr>
<td>Monosporascus cannonballus</td>
<td>+</td>
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<td>+</td>
</tr>
<tr>
<td>Melon Necrotic Spot Virus (MNSV)</td>
<td>+</td>
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<td>+</td>
</tr>
<tr>
<td>Meloidogyne sp.</td>
<td>+</td>
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</tbody>
</table>
Use of grafting in France

- **Melon**
  - *Fusarium oxysporum melonis*
  - *C. maxima x C. moschata*
  - Area with grafted plants
    - 1000 Ha

- **Cucumber**
  - *Phomopsis sclerotioides*
  - *C. ficifolia or*
  - *C. maxima x C. moschata*
  - Area 3% of the total
Use of grafting in Italy

- Melon
  - Fusarium oxysporum melonis
  - Hybrid cucurbita or Cucumis melo
  - 5-6 million plants grafted
  - Splice grafting
- Watermelon
  - Hybrid cucurbita
  - 20 million plants grafted
Use of grafting in Spain

- Melon
  - Monosporascus or MNSV
  - Hybrid cucurbita
  - Less than 1 million plants (Cantaloup and C.melo var flexuosus)

- Watermelon
  - Fusarium oxysporum niveum
  - Hybrid cucurbita
  - 30 million plants grafted (12000 Ha)
Use of grafting in other countries

• Greece
  • Melon and cucumber

• Israel
  • Melon (Monosporascus and Meloidogyne) and watermelon

• Jordan.
  • Grafting was introduced by “MB Phase Out Project”
  • Melon (10 Ha) and watermelon (40 Ha) and cucumber.

• Morocco
  • Melon and watermelon
Cost of grafted plants (seedless fruit)

- Cost of grafted plants
  - 2000 plants/Ha x 0.51 E/pl = 1020 E/Ha
  - 1000 plants/Ha x 0.33 E/pl = 330 “
  - TOTAL 1350 E/Ha

- Cost of ungrafted plants
  - 3000 plants/Ha x 0.21 E/pl = 630 E/Ha
  - 1500 plants/Ha x 0.05 E/pl = 75 “
  - TOTAL 705 E/ha

- Difference between grafted and ungrafted plants
  - 645 E/Ha

- Cost of MB disinfection
  - 6000 E/Ha
Conditions under which grafting melon is of interest

- Onto hybrid cucurbit (only compatible varieties)
  - Soil with Fusarium wilt, Monosporascus or MNSV
- Onto melon (varieties not resistant)
  - Soil with Fusarium wilt
- In case of infection by nematodes, combine grafting with nematicides, solarization or biofumigation
Conditions under which grafting cucumber is of interest

- In intensive farming
- Soil infected with Fusarium wilt or Phomopsis sclerotioides, graft onto Cucurbita ficifolia or C.maxima x C.moschata.
- If there are nematodes, combine grafting with other techniques.
Conditions under which grafting watermelon is of interest

- Grafting is always interesting, especially in soils with
  - Fusarium oxysporum niveum
  - Monosporascus cannonballus
  - Verticillium dahliae
  - Melon Necrotic Spot Virus
- In case of nematode infection, combine grafting with other practises or utilize resistant rootstocks (if possible)
Acknowledgments

- The author thanks the special collaboration of
- Mr Al-Zubi, M.F. (Jordan)
- Mr Amadio, A. (Italy)
- Mr Besri, M (Morocco)
- Mrs Erard, P and Mr Fritsch, J. (France)
- Mr Hoyos, P. (Spain)

for their valuable help