Rose Rootstocks Used in Turkey and Their Effects On Flower Yield and Quality

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Content

- Introduction
  - General knowledge about rose and rose production in Turkey
- Rose propagation methods
  - Generative / Seed
  - Vegetative / Cutting / Grafting / Layering / Micropropagation
- Budding and grafting methods
- Stenting grafting
- Rose rootstocks
- Effects of rootstocks on:
  - Graft union / Rooting rate /
  - Bud length / Bud Diameter / Flower stem Diameter
  - Flower stem length / Marketable Flower number
- Conclusion
- Most known,
- Widely grown ornamental plants
- This popularity can be attributed to many reasons,
  Of all the flowers the rose is the most closely associated with human emotions
Especially as a symbol of...

...love
Rose is a

- Symbol of many cities
- Religion, kingdoms
- Political parties
Cut Flower
- Garden and Landscape plants
Potted plant
Industrial Uses

Rose jam, rose oil, rose water, rose cream, attor of rose, etc.
Floriculture Sector of Turkey

- Total ornamental sector ..... 4512 ha.
- Value of ornamental sector 150 mil. $
- Cut flower sector
  - Area ............ 1104.6 ha
  - Value ............ 70 mil $
- Rose growing area ........ 161.2 ha
- Production amount..... 85 million flower/year
Rose Growing Area in Turkey

- Cut rose growing centers: İzmir, Antalya, Yalova, İstanbul, Mersin, Adana, Bursa, Urfa.
- Garden rose: Bursa (Kestel), İzmir (Bayındır, Urla, Ödemiş), Antalya, Adana, Yalova, Mersin nearly all the cities.
- Oil Rose: Isparta, Afyon, Denizli
Cut Rose
Garden Rose
Oil Rose
Propagation Methods in Rose

- **Generative**
- Seed
- **Vegetative**
- Cutting
- Grafting-Budding
- Micropropagation
Propagation by Seed

- Breeding program
- For rootstock growing
- Hard seed coat
- Germination
- Long time
- Needs cold treatment (2-4°C for 4-6 months)
Propagation by Cutting

(Cut rose – garden rose – oil rose – pot plant rose)

Cheaper/ Faster

Disadvantages:

- Short life
- Small rootball
- Agrobacterium tumefaciens
# Methods of Grafting and Budding

<table>
<thead>
<tr>
<th>Budding</th>
<th>Grafting</th>
</tr>
</thead>
<tbody>
<tr>
<td>T.budding</td>
<td>Whip graft</td>
</tr>
<tr>
<td>Patch budding</td>
<td>Cleft graft</td>
</tr>
<tr>
<td>Chip budding</td>
<td>Bridge graft</td>
</tr>
<tr>
<td></td>
<td>Approach graft</td>
</tr>
<tr>
<td></td>
<td>Wedge (side wedge)</td>
</tr>
<tr>
<td></td>
<td>Technique of stenting</td>
</tr>
</tbody>
</table>
Stenting Technique/Peg Graft

Graft of two cuttings
- Stenting is quite new and interesting grafting method
- It has some similarities with grape omega grafting

- Stenting is now being used world wide particularly by cut rose growers
- It can be done all year round
Steps of Stenting Graft

- Preparation of rootstock cuttings
  - 5-10 mm x 80-100 cm shoots
  - Upper and lower parts of the shoot and leaves are cutted
- Divide the shoot in 6-10 cm length shoot pieces
- Remove the bud eyes and thorns with graft knives
- Absence of bud on the rootstock is essential to diminish wild suckering.
Washing/Disenfection Soaking into Solution
For Scion Cutting

Vigorous shoots are taken 1 day before graft

Shoots have a flower bud nearly open
Cut the Upper part of the shoots above the first five leaflet leaf

Remove also lower 15 cm part of the shoots
Remaining part divided into pieces with one leaf and one axillary leaf bud
Leaves must have 5 leaflet.
Cut the basal part of scion and upper part of rootstock with sharp knives with 30° slope.
Union the two parts of the graft. Notice the cambium tissue touch each other.
Use clothes peg-or special silicon clip
Dip the basal end of the rootstocks into rooting hormone. Place the graft in substrate or paperpot.
Environment of the greenhouse is very important

Day temperature: 25°C
Night temperature: 17±2°C

R. Humidity:

1 week % 100-95
2 week % 90
3 week % 85
4 week % 75-80
5 week % 70
Things Happened One After Another

- The graft union between the scion and rootstock takes place.
- Callus formation begins 10. day after grafting.
After the connection of the scion and rootstock, a new vascular system is formed. The leaf production substances transfer through new vascular system to the base.
By the help of natural substances and rooting hormone, root formation happens. The rootstock develops root.
After rooting, or during rooting young shoot formed from leaf axil
Meanwhile, physiological process like photosynthesis, respiration, transpiration and hormone synthesis play an important role.

For successful grafting, formation of union, rooting and shooting take place in orderly.
Rootstocks used in Turkey

- *R. canina inermis*
- *R. corymbifera ‘’laxa’’*
- *R. indica “mayor” R. indica odorota*
- *R. multiflora*
- *Natal briar*
R. indica “Odorata” R. indica “Mayor”

<table>
<thead>
<tr>
<th>Dominant rootstock in warm countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Israel, Turkey, S. America</td>
</tr>
<tr>
<td>Naturaly grown in our country</td>
</tr>
<tr>
<td>Propagated by cuttings</td>
</tr>
<tr>
<td>Tolerant to high pH</td>
</tr>
<tr>
<td>Strong growing</td>
</tr>
<tr>
<td>Suitable for substrate growing</td>
</tr>
<tr>
<td>Vigorous and symetric root system</td>
</tr>
<tr>
<td>with stand variations in water supply</td>
</tr>
</tbody>
</table>

**Disadvantages**

- Incompatability with some commercial varieties
- Powdery mildew sentitivity
Rosa multiflora

- Japon and Korea
- Thornless
- Rapid vigorous and vertical growth
- Resistant to many stress conditions and nematodes
- Japon, Israel, South Africa and Turkey/
- İzmir, Yalova/Adana (Garden rose and cut flower)
- Found naturally in Turkey
- Disadvantages
- Deformed flowers (in some varieties)
Rosa canina Inermis

- **Origin:** Northern hemisphere
- **Dominant rootstock in Europe**
- **Propagated by seed**
- **Virus free**
- **Intense colour**
- **Better shape**
- **Used in substrate**
- **Drought resistance**
- **Well-performance in alkali conditions**
Disadvantages

- Difficult to propagate by cutting
- Not suitable for Stenting
- Off shoots
- Thorns
- Slow growth
Natal Briar

- Hybrid variety
- Since 1950
- Good performance for stenting
- Grown in substrate
- Propagated by cuttings
- Rootstock of cut roses
- New types were developed and introduced in recent years
- Expensive
Rosa corymbifera “Laxa”

- Northern Europe
- 120 years (1890)/ Otto Frobel
- Propagated by seed
- Garden and landscape roses
- Vigorous growing
- Budding grafting
Ekerler Roses/ 55ha/Bursa/ 2.5 mil. plant-year
Laxa ready for grafting
T- Budding

- Root knot
- Remove the soil around the root stem
T- Budding
The Effects of Rootstocks on Graft Union, Rooting Rate, Flower Productivity and Quality in three Rose Variety

- Mone Tarım Urfa 2 ha.
- R. multiflora
- R. odorata
- Natal Briar
- Stenting graft (top graft)
- Rooting substrate:
  - Cocopeat
  - Samourai
  - Dolomiti
  - Kalinka
The graft union rate ( %), 4 weeks after grafting in three variety.

<table>
<thead>
<tr>
<th>Rootstock</th>
<th>G.Union rate %</th>
<th>G.Union rate %</th>
<th>G.Union rate %</th>
<th>Avarage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Samourai</td>
<td>Dolamiti</td>
<td>Kalinka</td>
<td></td>
</tr>
<tr>
<td>Natal Briar</td>
<td>100</td>
<td>97.7</td>
<td>96.6</td>
<td>98.1</td>
</tr>
<tr>
<td>R. odorata</td>
<td>90.7</td>
<td>100.0</td>
<td>100.0</td>
<td>96.9</td>
</tr>
<tr>
<td>R. multiflora</td>
<td>98.8</td>
<td>100.0</td>
<td>100.0</td>
<td>99.6</td>
</tr>
</tbody>
</table>
The rooting rate (%), 4 weeks after grafting in three variety.

<table>
<thead>
<tr>
<th>Rootstock</th>
<th>Rooting rate (%) in Samourai</th>
<th>Rooting rate (%) in Dolamiti</th>
<th>Rooting rate (%) in Kalinka</th>
<th>Av.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natal Briar</td>
<td>96.6</td>
<td>92.2</td>
<td>92.2</td>
<td>93.7</td>
</tr>
<tr>
<td>R. odorata</td>
<td>67.4</td>
<td>83.2</td>
<td>82.2</td>
<td>77.6</td>
</tr>
<tr>
<td>R. multiflora</td>
<td>52.2</td>
<td>95.4</td>
<td>84.4</td>
<td>80.2</td>
</tr>
<tr>
<td>Avarage</td>
<td>72.0</td>
<td>90.3</td>
<td>86.3</td>
<td>83.8</td>
</tr>
</tbody>
</table>
## Rosebud Length (cm)

<table>
<thead>
<tr>
<th>Rootstocks/Variety</th>
<th>Samourai</th>
<th>Dolamiti</th>
<th>Kalinka</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natal Briar</td>
<td>5.2</td>
<td>5.5</td>
<td>5.9</td>
</tr>
<tr>
<td>Rosa odorata</td>
<td>5.1</td>
<td>5.5</td>
<td>5.9</td>
</tr>
<tr>
<td>Rosa multiflora</td>
<td>5.2</td>
<td>5.4</td>
<td>5.9</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>5.2</strong></td>
<td><strong>5.5</strong></td>
<td><strong>5.9</strong></td>
</tr>
</tbody>
</table>
# Rosebud diameter (mm)

<table>
<thead>
<tr>
<th></th>
<th>Samourai</th>
<th>Dolamiti</th>
<th>Kalinka</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Natal Briar</strong></td>
<td>3.5</td>
<td>3.9</td>
<td>4.6</td>
</tr>
<tr>
<td><strong>R. odorata</strong></td>
<td>3.5</td>
<td>3.8</td>
<td>4.5</td>
</tr>
<tr>
<td><strong>R. multiflora</strong></td>
<td>3.4</td>
<td>3.9</td>
<td>4.6</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Flower stem diameter (mm)

<table>
<thead>
<tr>
<th></th>
<th>Samourai</th>
<th>Dolamiti</th>
<th>Kalinka</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natal Briar</td>
<td>6.2</td>
<td>5.5</td>
<td>6.3</td>
</tr>
<tr>
<td>R. odorata</td>
<td>6.1</td>
<td>5.5</td>
<td>6.2</td>
</tr>
<tr>
<td>R. multiflora</td>
<td>6.1</td>
<td>5.7</td>
<td>6.4</td>
</tr>
<tr>
<td>Average</td>
<td>6.1</td>
<td>5.6</td>
<td>6.3</td>
</tr>
<tr>
<td>Rootstocks/variety</td>
<td>Samourai</td>
<td>Dolomiti</td>
<td>Kalinka</td>
</tr>
<tr>
<td>-------------------</td>
<td>----------</td>
<td>----------</td>
<td>---------</td>
</tr>
<tr>
<td>Natal Briar</td>
<td>70.7</td>
<td>62.3</td>
<td>60.2</td>
</tr>
<tr>
<td>R. odorata</td>
<td>66.1</td>
<td>60.8</td>
<td>58.4</td>
</tr>
<tr>
<td>R. multiflora</td>
<td>67.3</td>
<td>59.9</td>
<td>59.7</td>
</tr>
<tr>
<td>Average</td>
<td>68.0</td>
<td>61.0</td>
<td>59.4</td>
</tr>
</tbody>
</table>
Flower Stem Length

- Samurai: 70.7, 66.1, 67.3, 68.0
- Dolomite: 62.3, 60.8, 59.9, 61.0
- Kalinka: 60.2, 58.4, 59.7, 59.4

Legend:
- Natal Briar
- R. odorata
- R. multiflora
- Average
The effects of rootstocks on total number of marketable flowers (Flower number/plant/year)

<table>
<thead>
<tr>
<th>Rootstock /Variety</th>
<th>Samourai</th>
<th>Dolomiti</th>
<th>Kalinka</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natal Briar</td>
<td>16.9</td>
<td>20.0</td>
<td>18.0</td>
<td>18.3</td>
</tr>
<tr>
<td>R. odorata</td>
<td>14.8</td>
<td>18.9</td>
<td>18.7</td>
<td>17.5</td>
</tr>
<tr>
<td>R. multiflora</td>
<td>14.7</td>
<td>17.3</td>
<td>16.8</td>
<td>16.3</td>
</tr>
<tr>
<td>Avarage</td>
<td>15.5</td>
<td>18.7</td>
<td>17.8</td>
<td>17.3</td>
</tr>
</tbody>
</table>
The effects of rootstocks on total number of marketable flowers (flower number/plant/year)

- **Samurai**: 16.9, 20, 14.8
- **Dolomite**: 17.3, 18.9, 18.7
- **Kalinka**: 18.0, 18.7, 16.8

- **Natal Briar**
- **R. odorata**
- **R. multiflora**
- **Average**
Conclusion

- Stem length, flower number and rooting ratio are affected from rootstock variety combination.
- Natal Briar has good union and rooting capacity and it also affects the scion variety positively.
- Natal Briar gives the highest values in flower stem length and flower productivity.
- So it is a well performance rootstock amongst the tested rootstocks.
- R. odorata and multiflora may be chosen for white or pale colour varieties
- Dolamiti is a high yielded cultivar on both rootstocks

- Samourai is a long stem but less productive variety within these combinations
Conclusion

- Rootstock/variety combinations are very important in roses, as if in all other horticultural crops.
- Results belong to first year of culture.
- Comparison should be continued in the next years for having better idea about rootstocks.
- This kind of trials should be done also in soil growing, because nearly %90 of rose growing are in soil in Turkey.
Last Words

- Even with so many choises
- There is no perfect rootstock
- Just as there is no perfect rose
- Breeding/selection and investigations must go on
Thank You So Much for your kind attention

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