Rootstock for the computer controlled environment, an industry perspective

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High Tech Greenhouse

- Computer controlled
  - Venting
  - Heating
  - Irrigation
- CO2 → Dutch industry
- Soil less (Organic crops?)
  - Rockwool
  - Coco Peat
  - NFT

Tomatoes, Cucumbers and Peppers

Canada Greenhouse Area

1.2. Harvested area of greenhouse vegetables by province (square metres)

	2012	2013	2014	2015	2016
Newfoundland and Labrador	2,522	3,018	3,235	4,296	647
Prince Edward Island	x	1,236	1,398	x	x
Nova Scotia	51,554	63,959	67,577	77,992	x
New Brunswick	x	x	x	5,042	121
Ontario	8,946,414	9,536,949	9,648,343	10,061,138	10,786,891
Quebec	813,802	974,967	909,517	951,534	914,546
Manitoba	6,778	6,595	835	5,245	496
Saskatchewan	4,575	15,250	12,978	14,139	2,003
Alberta	520,013	541,095	530,301	544,222	547,626
British Columbia	2,890,257	2,953,999	3,014,961	2,881,096	3,042,197
Canada	**13,342,785**	**14,159,519**	**14,234,970**	**14,592,089**	**15,624,257**

x: Too unreliable to be published or suppressed to meet the confidentiality requirements of the *Statistics Act*.

Source: Statistics Canada. (CANSIM Table 001-0006)

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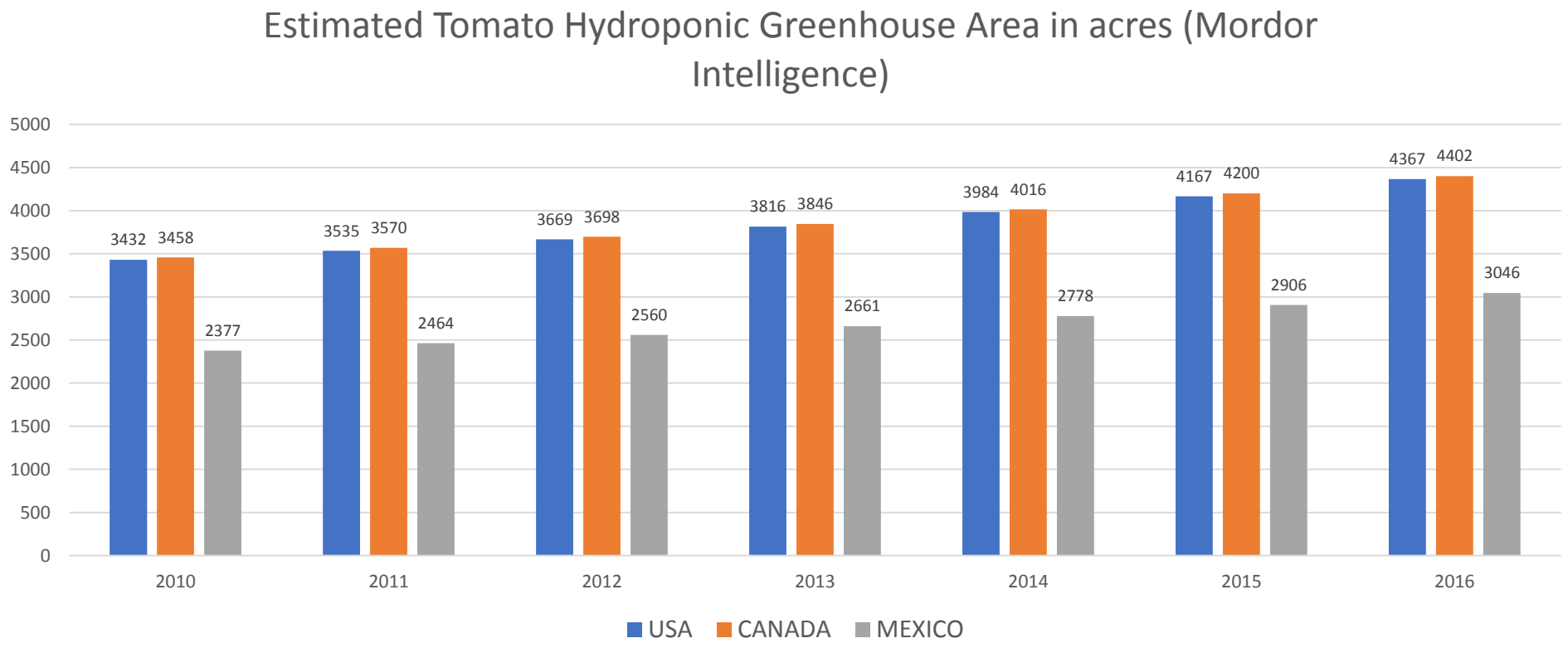
Growth



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Why using rootstocks in high tech greenhouses?

- **Vigor**
- **Disease Resistance**
- **Precision growing: balance and performance**

VIGOR is needed for

Long crop cycles – 11 months

Year Round or AL crops

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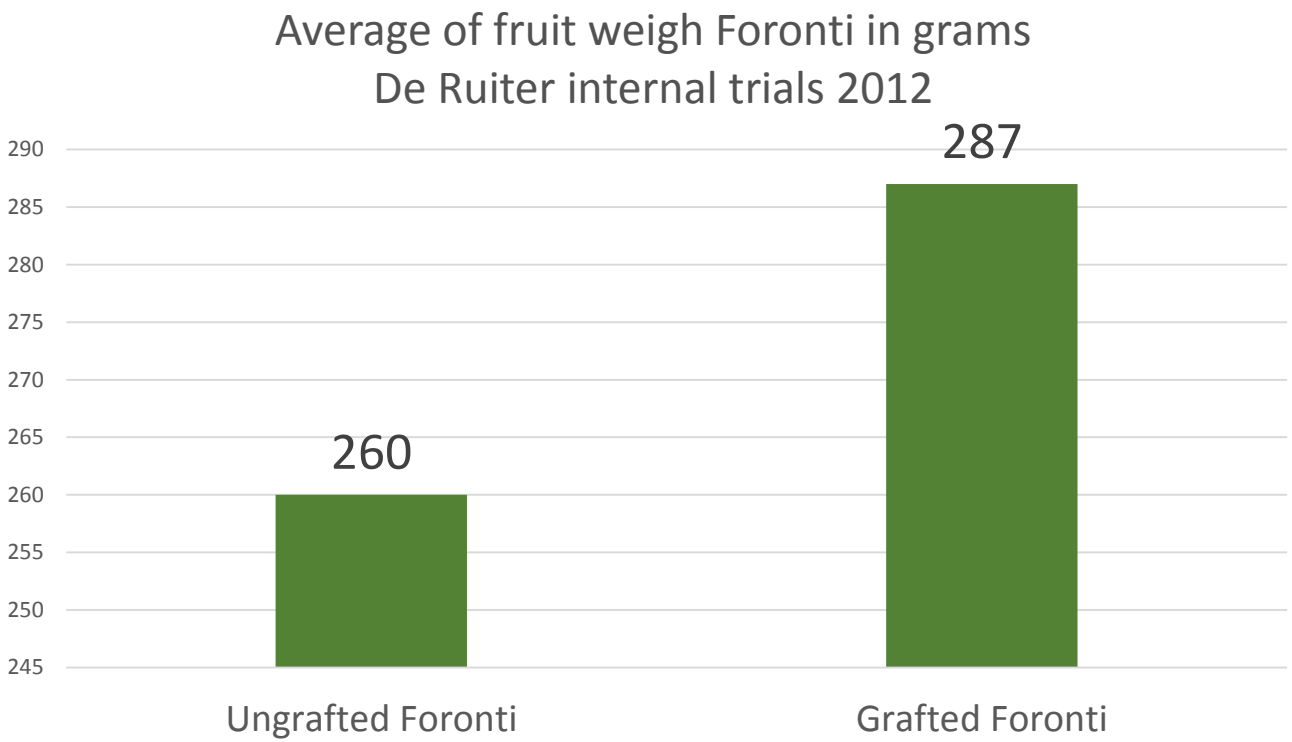
For scions of generative behaviour and or medium vigor, GRAFTING is a must to provide extra VIGOR

- Specific Beef steak hybrid Torero
- Product Market Category: Grape and Cherry tomatoes

DR0141TX

Vigorous scion + Roostock



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Disease Resistance – some scions lack basic resistances

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Basic resistances in rootstocks

HR ToMV/Ff:A-E/Fol:0,1/For/Pl/Va/Vd
IR: Ma/Mi/Mj

- **Some materials lack For – Ducovery Beef steak**
- **Some other materials lack Va/Vd**
- **…and few growers – knowing the lack of resistances - still don't graft.**

Resistance package

- HR ToMV/Ff:A-E/Fol:0,2/For/Pl/Va/Vd IR: Ma/Mi/Mj
  - Multifort – vigor and extra resistance Fol
- HR ToMV/Ff:A-E/Fol:0,1/For/Pl/Va/Vd IR: Ma/Mi/Mj
  - Maxifort – vigor and balance
  - DR0138TX – generative steering
  - DR0141TX – extra vigor and yield potential

Maxifort

DR0141TX

Nematodes resistance

- Multifort – common in organic crops in MX
- Potential launch of new material in fall 2018 specifically for Nematodes

Precision growing: balance and performance

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Any penny counts…better performance if grafted!

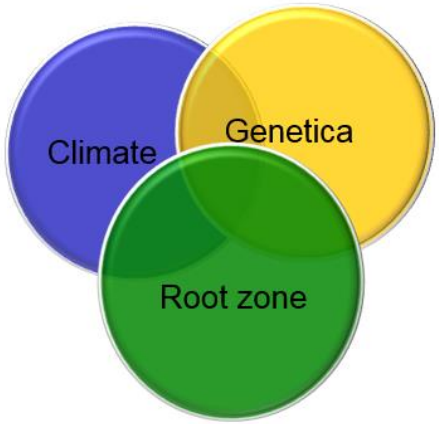
Crop Cycle	Jan-Nov
Crop type	Large Truss
Crop area (acres)	10

	Ungrafted	Grafted
Yield (kg/m2)	55	58
Yield (lb/m2)	121	127.6
Price per pound	$ 0.60	$ 0.60

Yield difference (kg/m2)	3
Yield difference in lbs	6.6
Extra lbs in total crop area	264000
Extra income	$ 158,400.00

Cost of roostock seed in 10 acres	$ 25,000.00

Precision Growing



Early production
→ generative rootstock

Strong vigorous & vegetative scions
→ generative roostock + environment control

Winter crops = vegetative environment
→ generative roostock (+AL)

Less vigorous scions
→ vigorous roostocks

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grow forward

Precision growing
Crop registration
24 hours temperature
Irrigation strategy
Humidity control
Crop labor

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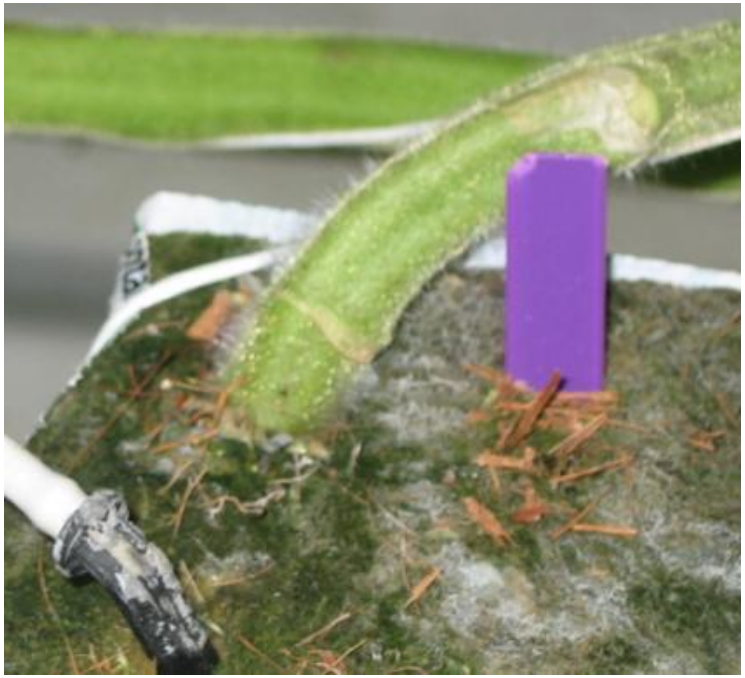
Grafting

- 2:1 or 1:1 heads of scion
- Pinched 2nd true leaf or cotyledon grafting



Types of blocks – 10x10 or 10x15

CHALLENGES

- Communication of best options
- Seed germination & UT
- Plant raiser quality results
- Added value trials
- More detailed studies showing best matches
- Bacterial Canker
- Agrobacterium

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FUTURE

Improved germination and uniformity → DR0141TX

Improved resistance package to diseases: TSWV (scion → rootstocks ?), *Phytophthora capsici*.

Improved resistance package to nematodes → strong indication the DR0656TX is an improvement over Multifort and other commercially available materials.

Better studies to make best matches rootstocks to scions.

Better control of Agrobacterium – strong materials and yet good generative response

Artificial light use is increasing: interplanting more frequently seen → disease pressure

Thank you

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References

De Ruiter sites
https://www.deruiterseeds.com/en-ca.html
https://www.deruiterseeds.com/nl-nl.html
Disease guide
https://www.deruiterseeds.com/en-ca/resources/disease-guides/tomato-disease-guide.html