Selection of *Prunus spinosa* as a dwarfing rootstock for high density plum orchards

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Aims of rootstock selection program

- Rootstock for plum giving a tree vigour weaker than St. Julien A
- Precocious yields of high-quality fruits
- Resistant rootstock (frost, *Pseudomonas, Sharka*)
- Good propagation and grafting properties
- Applicable for plum as well as for other stone fruit species (peach, nectarine, apricot)

Why *Prunus spinosa*?

- Genetic relationship and recorded graft compatibility with plum and apricot
- Positive experience when used as rootstock in previous trials

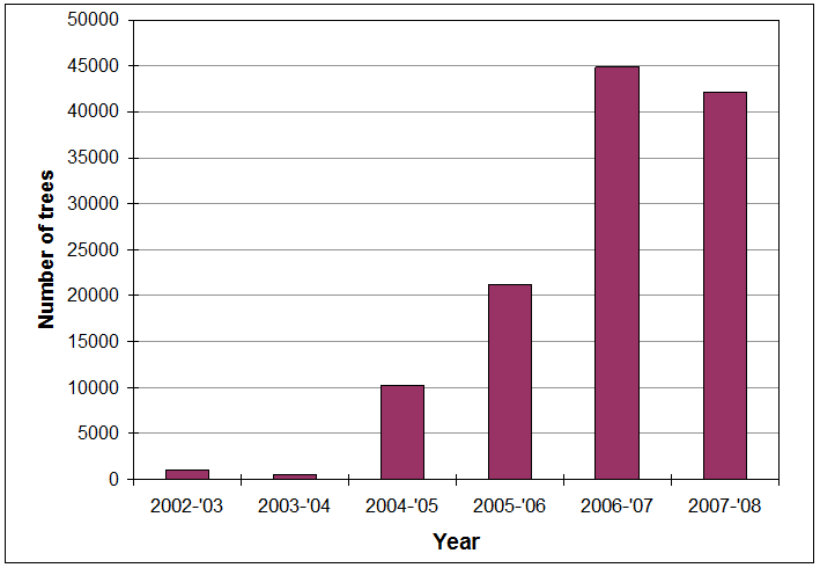
N.B. At the start of the *Prunus spinosa* selection program Krymsk-1 (VVA-1) was still unknown

History of selection program since 1987

- 1987 Fruit research station Wilheminadorp
  1.000 seedlings (Bob Wertheim)
- 1990 Budding of ‘Opal’ on 583 P. spinosa seedlings
- 1991 Selection of the 113 best looking trees
- 1992 – 1999 Evaluation tree growth and fruit production
- 2000 Move research station to Randwijk. Root balls of the best 17 trees were replanted in a hedgerow

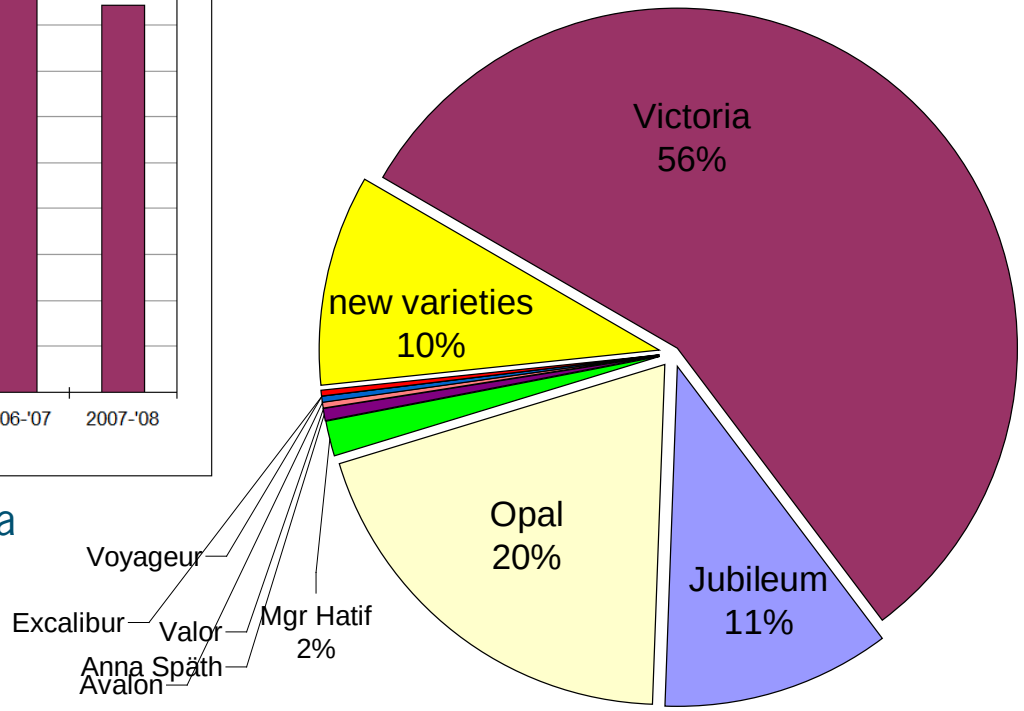
Introduction and sales of plum trees on Krymsk-1 in the Netherlands

Commercial sales of trees on VVA-1 in NL



Plum production area NL: 250 ha

Total sales 2002-2008: 120,205 trees



Problems with Krymsk-1 in commercial orchards

Tree decline

Disease symptoms of bacterial (*Pseudomonas)* canker

Photo's: Marcel Wenneker, PPO-Randwijk, NL

Continuation of selection and evaluation of *P. spinosa* as plum rootstocks in Randwijk

- Development of clonal propagation method (2003-2007)
  - Winter cuttings not successfull (insufficient rooting)
  - Summer cuttings more successfull (better rooting)

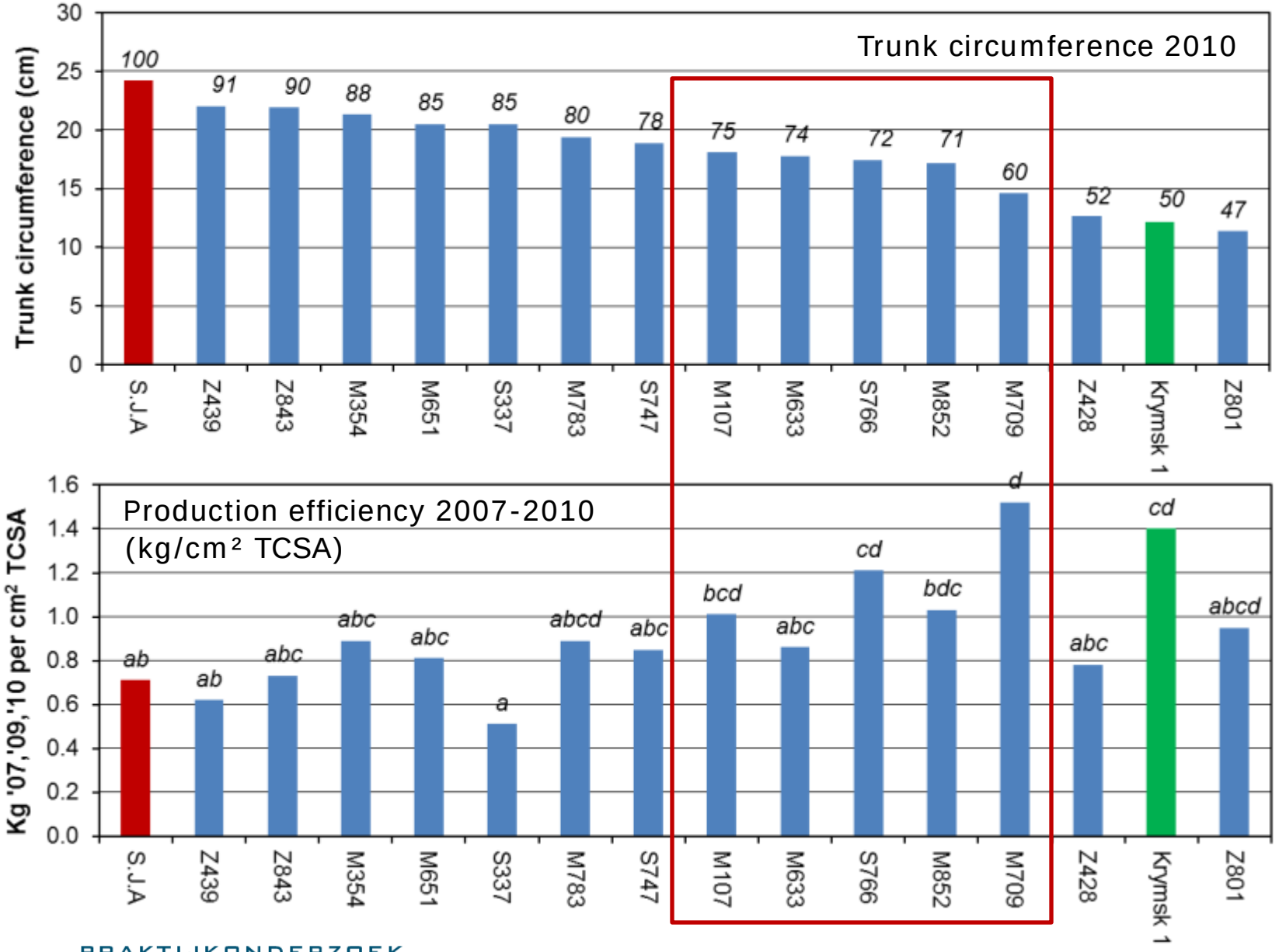
- New rootstock evalution trials (2005-2010)
  - 3 trials with ‘Victoria’ as scion cultivar on 15 *P. spinosa* selections

    (trees planted in 2005, 2006 en 2008)

Selection criteria

- Tree vigour intermediate between that on St. Julien A and Krymsk-1
- Production efficiency
- Fruit quality (size, fruit cracks, gummosis)
- Root suckers
- Presence/abundance of thorns

Effect rootstocks on tree vigour and production efficiency



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Trial with plum 'Victoria' planted in 2006

Results of trials at research station Randwijk

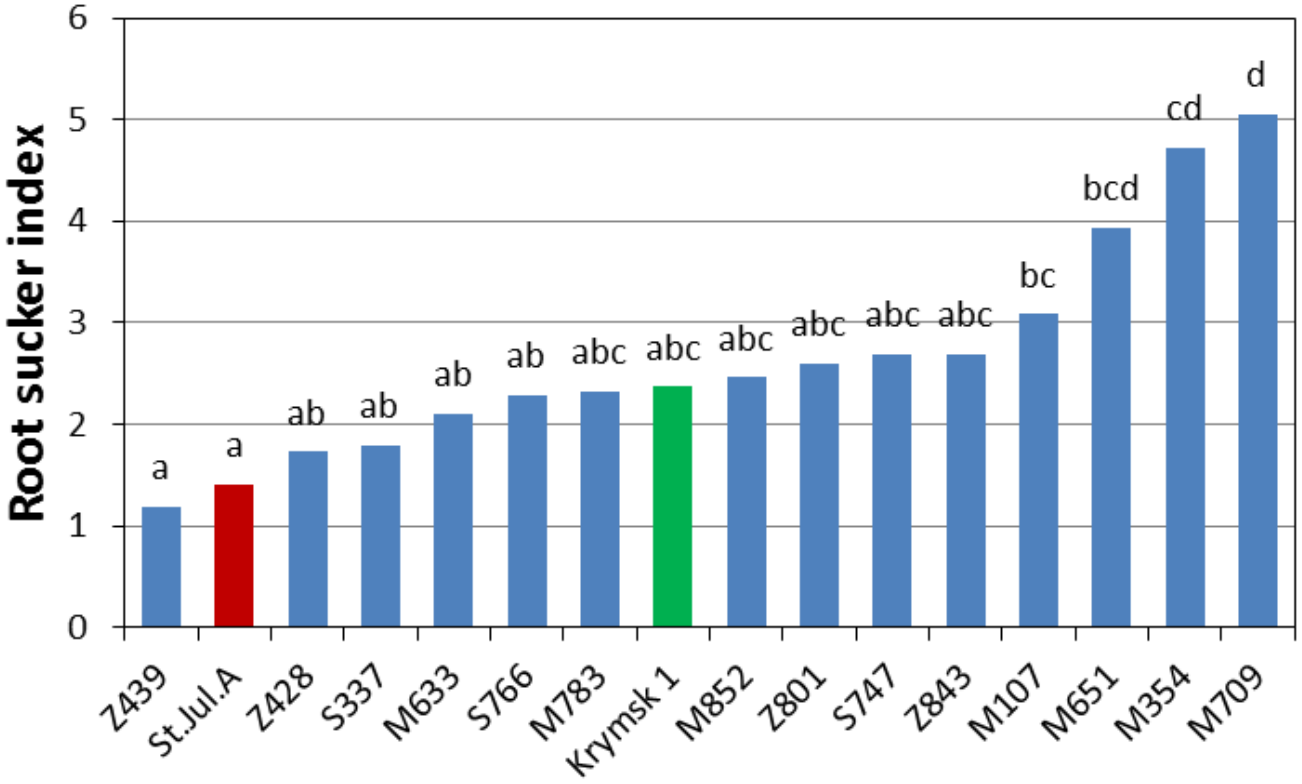
‘Victoria’ 6 years after planting


November 2011, year 6
St. Julien A
S766
M633


Bloom 2012, year 7
St. Julien A
S766
M633

Development root suckers 2006-2011

Root suckers indexed on scale of 1 (no suckers) to 9 (very strong suckering)



M709 rejected: too many root suckers

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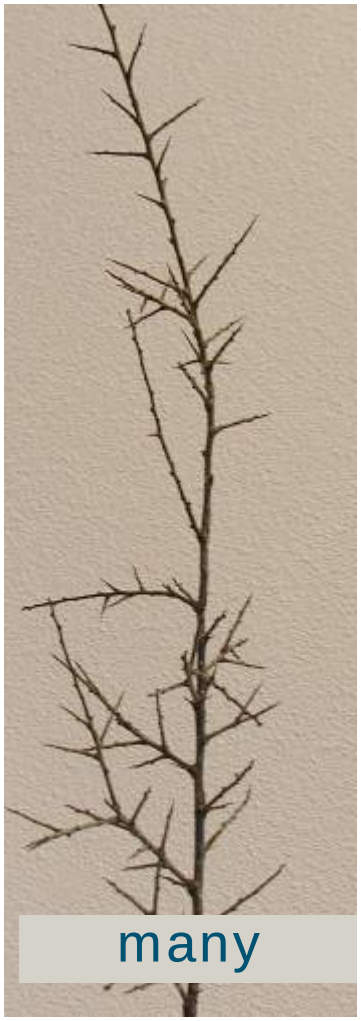
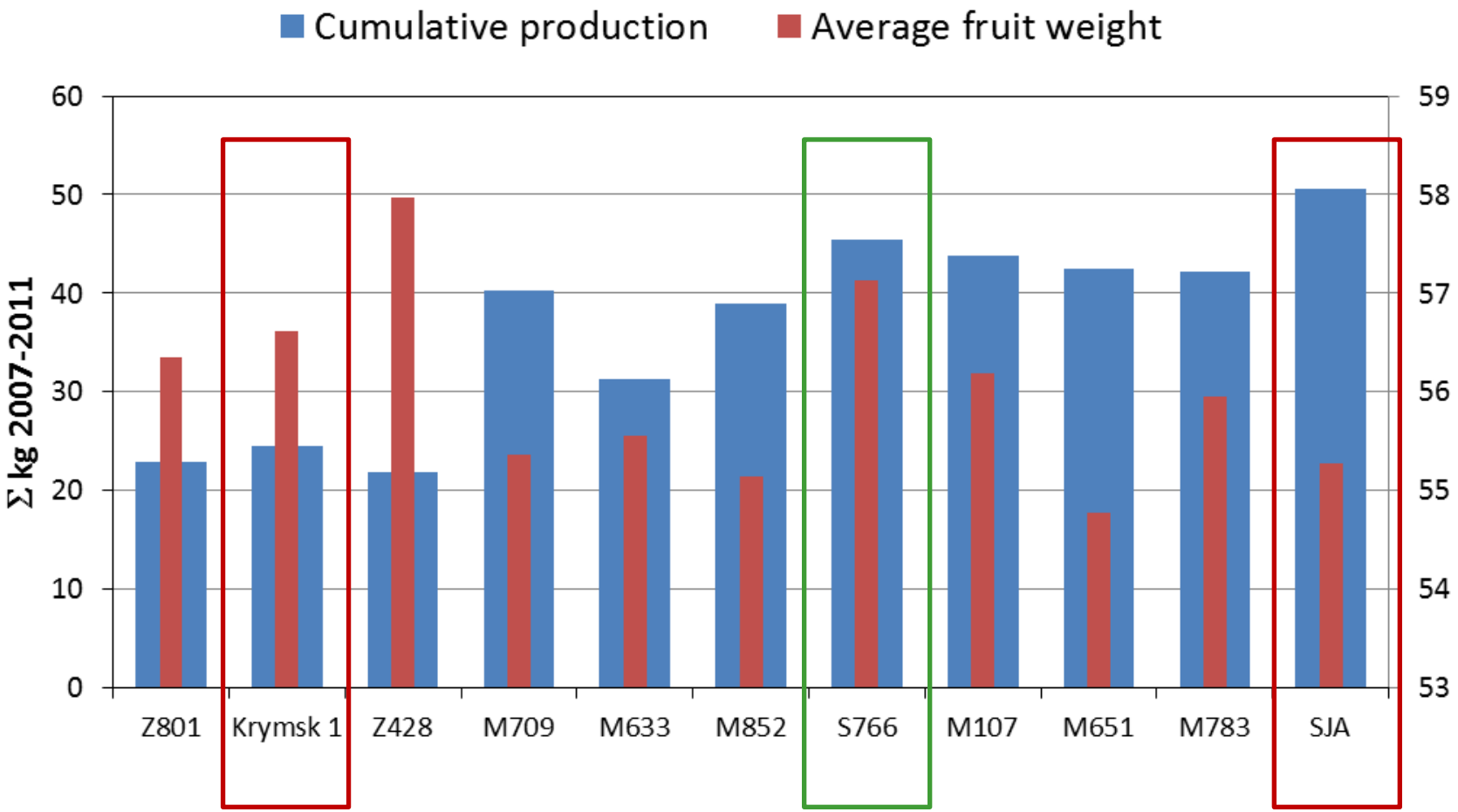
Variability in spine development *P. spinosa*



Effect rootstock on yield and fruit weight ‘Victoria’



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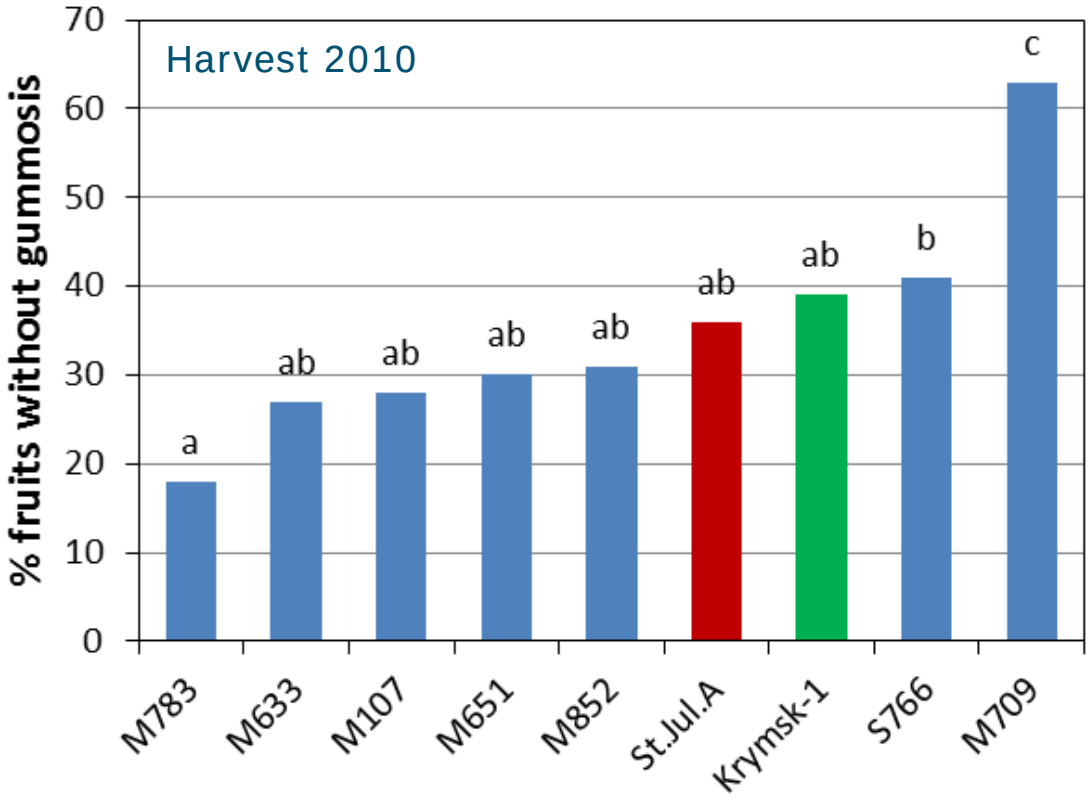
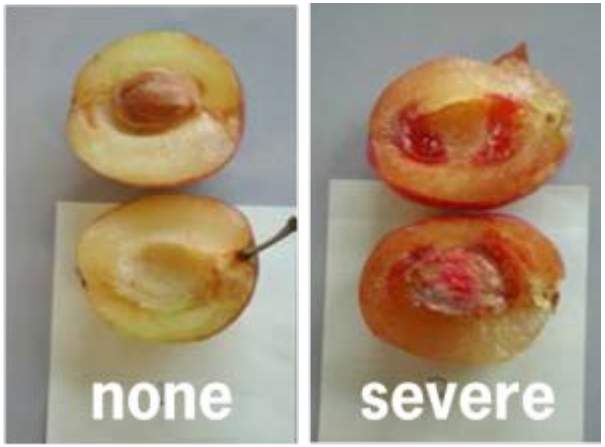
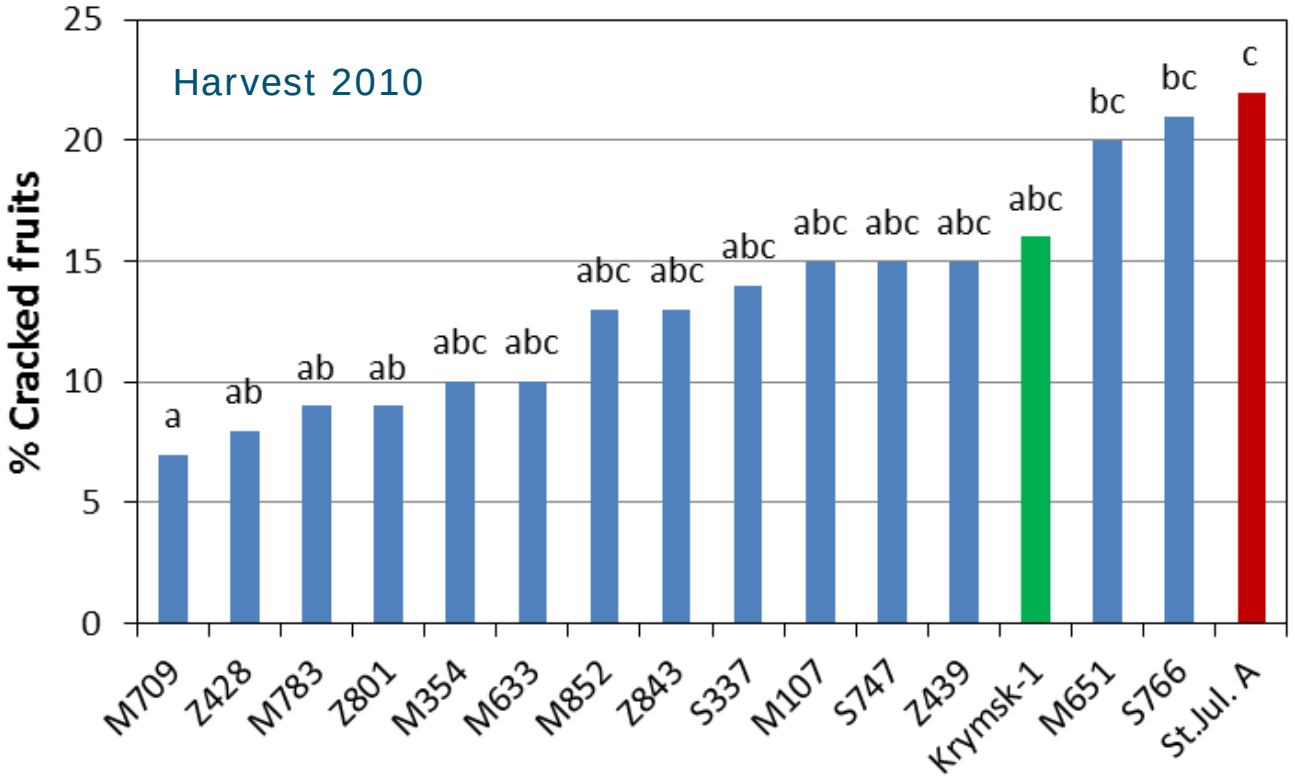
Effect rootstock on fruit gummosis





Effect rootstock on % cracked fruits

Trend towards lower % of cracked fruits with some *P. spinosa* selections (F-test: P=0.066)



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Summary performance *Prunus spinosa* rootstocks

Rootstock	Growth reduction[1]	Production efficiency[1]	Fruit size[1]	Root suckers[2]	Spines[2]
Z843	5%	+-	+	3-4	3-5
Z439	10 %	-	+	1	9
M354	5-20%	+	+	6	3-5
S337	10-25%	+ / -	-	1-5	3-5
S747	15-20%	+	+	2	7
M651	20%	+(-)	+-	8	6
M783	20-25%	+(-)	+(-)	2	3-5
M107	25-30%	+	+	8	3-5
Z562	30%	+	+-	3	9
M633	25-35%	+(-)	+(-)	2-6	3
S766	35%	++	++	4	6
M852	35-40%	+	+-	3-5	8
Z428	15-50%	+	++	3-5	6
M709	45%	++	+-	7	9
Z801	60%	+	+	3	9

[1] relative to St. Julien A; [2] on scale of 1 (very few) to 9 (very many)

Graft compatibility *P. spinosa* and plum

- No problems observed with ‘Opal’ and ‘Victoria’

Graft unions ‘Victoria’ plum grafted on St. Julien A, Krymsk-1 and *P. spinosa* S766

Year of planting: 2008 Photo’s: 2012-11-27

Next steps towards market introduction *P. spinosa* rootstock selection(s)

- VIRUS FREE plant material of the best selections
  - 2009 : 7 selections sent to NAKTuinbouw
  - 2010 : 5 selecties tested for virus diseases
  - 2011 : 2 selections virus free
  - Application for breeders' rights for selection S-766

In vitro propagated plant material

Schrama Fruit Tree Nursery, Biddinghuizen, The Netherlands

Further actions

- 2013 Planting demonstration pilots ‘Victoria’ and Lazoet plums in commercial orchards in the Netherlands
- Founding of consortium of Dutch nurseries for propagation and production of selected *P. spinosa* rootstocks and fruit trees on *P. spinosa* rootstocks
- Issuance of *P. spinosa* rootstocks and fruit trees on *P. spinosa* for evaluation trials in other counties

INTERESTED? contact frank.maas@wur.nl

Thank you for your attention

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