



Gerard Poldervaart
gerard.poldervaart@fruitmagazine.eu



Frank Maas
frank.maas@wur.nl

VVA-1 most beneficial for moderately productive plum varieties

Info

Vigour

In the trial with the varieties Avalon and Excalibur, the increase in trunk circumference is measured as an indication of the vigour. For Excalibur, between 1997 and 2007 the trunk circumference of the trees on VVA-1 increased 38% less than for trees on St. Julien A. For Avalon, the difference between both rootstocks was 32%.

The plum rootstock VVA-1 (Krymsk 1) originates from the breeding programme of Dr. Gennady Eremin of the Krymsk breeding station in Russia. In 1994, the former fruit-growing research station in Wilhelminadorp, the Netherlands, started the first trial in which this rootstock was compared to St. Julien A, the rootstock that until then was the standard one used for plums. This research was continued at PPO-Fruit in Randwijk, the Netherlands. In total, four varieties were trialled. In all cases the trees on VVA-1 were compared to those on St. Julien A.

This research showed that VVA-1 ensured dwarf growth and the early occurrence of high production levels combined with good fruit size. There also proves to be a difference in how productive

varieties (Queen Victoria, Opal) and moderately productive varieties (Excalibur, Avalon) respond to the rootstock. For productive varieties, up to and including the fourth or fifth leaf, the level of production per tree was greater on VVA-1 than on St. Julien A. However, after the fourth or fifth leaf, the tree volume has a decisive impact on the production levels. Because trees on St. Julien A grow larger than those on VVA-1, the production level per tree on St. Julien A often exceeds that of trees on VVA-1.

The production level per unit of growth – referred to as the productivity or the production efficiency – is for trees on VVA-1 more or less always greater than for trees on St. Julien A. Nevertheless, the fruit size is often better for trees on VVA-1. For varieties that are less productive, the positive impact of VVA-1 on production levels per tree is visible much longer. The trial showed that the difference in production efficiency between trees on St. Julien A and those on VVA-1 is for moderately productive varieties also much greater than for more productive varieties. Here production efficiency is expressed in terms of the number of fruits per square centimetre of trunk cross sectional area.

Opal

In the spring of 1994 at the former research station in Wilhelminadorp, the Netherlands, a trial of plum rootstocks, including VVA-1 and St. Julien A was started. Up to and including the fifth leaf, the trees on VVA-1 produced more kilos of plums than the trees on St. Julien A (see Figure 1). From the sixth leaf, the trees on St. Julien A began to produce more. After the seventh leaf there was no difference in production levels per tree between the trees on the different rootstocks. Opal on VVA-1 displayed a greater production efficiency (19.8 fruits/cm²) than Opal on St. Julien A (15.6 fruits/cm²), but the differences were not statistically significant.



VVA-1 results in small, highly productive trees.

Photos: AllroundFruit

Queen Victoria

Queen Victoria is known to be a productive variety. Trees can start producing from the third leaf, also on a strong rootstock. In the spring of 2000, PPO-Fruit in Randwijk, the Netherlands, started a trial of Queen Victoria planted on VVA-1 and on St. Julien A. In the trial, the trees were planted at a distance of 3.60 x 2.00 meters. The same tendencies were seen for Queen Victoria as for Opal. Up to and including the fourth leaf, the trees on VVA-1 produced more kilos per tree. After the fourth leaf, the trees on St. Julien A started to produce more due to the greater tree volume (see Figure 2). Eventually, the trees on St. Julien A produced more during the eight years of the trial than the trees on VVA-1. However, the production efficiency of the trees on VVA-1 was more than twice as great as for the trees on St. Julien A (see Table 1).

Avalon and Excalibur

The oldest trial in Randwijk with trees on VVA-1 was planted in 1997 at a distance of 3.60 by 2.00 metres with the trial varieties Avalon and Excalibur. In more or less every year, the trees on VVA-1 produced more than the trees on St. Julien A. After nine trial years, this resulted in the following: the trees on VVA-1 produced more per tree and were much more productive than the trees on St. Julien A (see Tables 2 and 3). The productivity of the trees on VVA-1 was also better than that of the other rootstocks in the trial, Ferlenain and Pixy.



The trees on VVA-1 remain small, allowing the majority of the work to be done from the ground.

For moderately productive varieties, the difference in production efficiency is large. For Avalon, the number of fruits per square centimetre of trunk cross sectional area for the trees on VVA-1 was 3.4 times as great (0.41) as for the trees on St. Julien A (0.12). For Excalibur, the difference was even greater, namely 4.3 times (0.26 fruits/cm² for trees on VVA-1 compared to 0.06 for trees on St. Julien A).

The research described in this article was financed by the 'Product Board for Horticulture' in the Netherlands.

Practical experiences

Since the spring of 2003, plum trees have been planted on VVA-1. Initially there was only a limited number of trees available on this rootstock,

Table 1. The total production (in kilos/tree), the average fruit weight (in grams) and the production efficiency (number of fruits/cm²) of Queen Victoria on St. Julien A and on VVA-1

Queen Victoria on rootstock	Production 2001-2007*		Fruit weight 2001-2007*		Production efficiency TCSA** 2008	
St. Julien A	77,7	a	47,6	a	17,4	a
VVA-1	66,6	b	52,3	b	38,9	b

Source: PPO-Fruit

For the values within a column that are followed by the same letter, the differences are not statistically reliable.

* The second through eighth leaf.

** TCSA = Trunk Cross Sectional Area.

Figure 1. The production level (in kilos/tree) of Opal on VVA-1 and on St. Julien A from 1996 through 2000 (the third through seventh leaf)

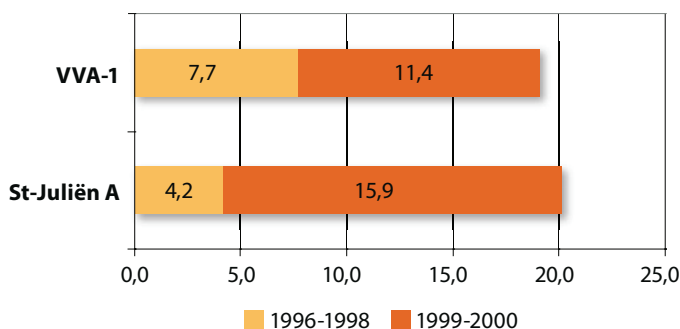
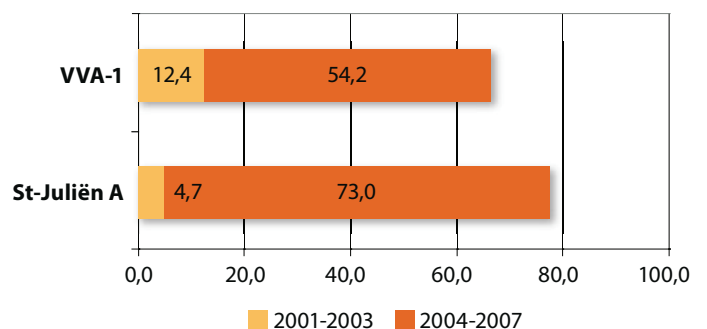


Figure 2. The production level (in kilos/tree) of Queen Victoria on VVA-1 and on St. Julien A from 2001 through 2007 (the second through eighth leaf)





For moderately productive varieties, the influence of VVA-1 on production levels is the greatest.



IFTA Conference

From 1 to 3 February, the International Fruit Tree Association, a fruit growers' association with approximately 1100 mainly American members, held its annual conference in Potsdam, near Berlin. For two and a half days, the attendees could listen to lectures about product developments, growing techniques, new varieties, cherry cultivation and organic fruit growing. This article describes the (trial) experiences with the VVA-1 rootstock for plums in the Netherlands.

but since the 2004/05 planting season, a larger number have been supplied. Up to and including 2008, this was 120,000 trees, the majority of which were planted in the Netherlands. The information from the only supplier of trees on VVA-1 in the Netherlands, tree nursery Botden & van Willegen, shows that these were mainly the variety Queen Victoria (55%), followed by Opal (20%). Smaller numbers were supplied of Jubileum, and of several new plum varieties that are being marketed by The Greenery under the club concept.

The dwarf growth of trees on VVA-1 makes it possible to plant the trees at a distance of 3.50 by 1.25 metres (2,285 trees per hectare), a planting

density that makes annual production levels of 25 to 30 tonnes of Queen Victoria and Opal per hectare achievable. This is a considerable increase when compared to the 20 to 25 tonnes per hectare that are achievable for both varieties on the rootstock St. Julien A at a planting distance of 4.0 by 2.0 metres (1,250 trees per hectare).

The positive properties identified by the trial have been confirmed in many commercial orchards. The trees achieve a high level of production. During the summer, the fruit size on VVA-1 seems to lag behind, but this is made up later in the season. Mainly in years with unfavourable conditions for the fruit to set (night frost, cold and wet weather during blossoming), as occurred in 2008 in the Netherlands, the trees on VVA-1 seem to be clearly more productive than those on St. Julien A.

Limitations

Based on the experiences in commercial orchards, the conclusion can be drawn that it is absolutely essential for trees on VVA-1 to be irrigated well to be able to perform to the optimum. On sites without drip irrigation or overhead sprinklers growth can be too poor. For trees that display such extreme dwarf growth, the fruit size is disappointing.

In the Netherlands, the advice is to always install drip irrigation with fertigation for trees on VVA-1. Moreover, by covering the soil with organic material, the moisture content and with it root and tree growth can be promoted even more.

Table 2. The total production (in kilos/tree), the average fruit weight (in grams) and the production efficiency (number of fruits/cm²) of Avalon on four different rootstocks

Avalon on rootstock	Production 1999-2005*		Fruit weight 1999-2005	Production efficiency TCSA** 2005	
St. Julien A	25,1	b	59	0,12	a
VVA-1	45,2	d	57	0,41	c
Ferlenain	15,3	a	63	0,09	a
Pixy	29,9	c	58	0,21	b

Source: PPO-Fruit

For the values within a column that are followed by the same letter, the differences are not statistically reliable.

* The third through ninth leaf.

** TCSA = Trunk Cross Sectional Area.

Table 3. The total production (in kilos/tree), the average fruit weight (in grams) and the production efficiency (number of fruits/cm²) of Excalibur on four different rootstocks

Excalibur on rootstock	Production 1999-2005*		Fruit weight 1999-2005	Production efficiency TCSA** 2005	
St. Julien A	13,3	a	81	0,06	a
VVA-1	28	c	82	0,26	c
Ferlenain	22,9	bc	85	0,13	b
Pixy	18,2	ab	79	0,1	ab

Source: PPO-Fruit

For the values within a column that are followed by the same letter, the differences are not statistically reliable.

* The third through ninth leaf.

** TCSA = Trunk Cross Sectional Area.