

FINAL PROJECT REPORT

Project Title: WA 38 rootstock and systems trial

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Other funding sources: None

Total Project Funding: Year 1: \$36,254 (revised to 91% of original as requested)

Budget History:

Budget 1

Item	Year 1: 2013
Salaries	0
Benefits	0
Wages	0
Benefits	0
Equipment	0
Supplies ¹	10,898
Travel ²	186
Plot Fees	1,865
Miscellaneous ³	2,099
Miscellaneous ⁴	5,781
Total	\$20,829

Footnotes:

¹Supplies includes irrigation and trellis system

²Travel to Sunrise orchard as required

³Contractor to put in posts and anchors

⁴Labor for planting and trellis installation

Budget 2

Item	Year 1: 2013
Supplies - Trees	15,425
Total	\$15,425

Footnotes:

2158 trees are expected on G.41 and M9 rootstocks, available for planting spring 2013.

ORIGINAL OBJECTIVES

The WSU apple breeding program has recently released a very promising red variety, WA 38, characterized by an unusually firm, crisp and juicy texture. The interest in this apple is widespread within the Washington industry. Once sufficient trees have been propagated they will be available to purchase in 2017. WA 38 has been studied in Phase 3 trials of the breeding program, which primarily focuses on the generation of higher volumes of fruit for different purposes, but a more complete investigation of different training systems should be carried out to determine optimum production systems for this variety. We believe that a training system and rootstocks trial on an experimental scale is necessary to assess the variety and collect as much information as possible about its behavior on different combinations. This one-year project established a WA 38 orchard at the Sunrise orchard (Wenatchee, WA) on two rootstocks (G41 and M9-Nic29) each of them trained to a different system. The same planting was repeated at the Roza orchard (Prosser, WA). This dual-site comparison can also address the suitability of WA 38 under different growing conditions since the two locations differ in soil fertility and structure (Prosser is more fertile than Sunrise). We consider this trial valuable for the industry because it will provide answers that will lead to the development of management guidelines for the future growers of WA 38.

SIGNIFICANT FINDINGS

❖ Sunrise orchard:

- During spring 2013, soil in Sunrise was prepared for the new planting (the ground was fumigated, fall 2012).
- Wooden posts and three wires were set up and anchored prior to planting. Wooden posts were placed every 33 ft within the row and this space was covered with different number of WA 38 trees: 11 for spindle and 20 for the V system. The inclination angle of planting for the trees trained at V is 15-20° from the vertical. The total number of trees per training system regardless of rootstocks is 308 for spindle and 560 for V (Fig.1).
- The WA 38 orchard was planted in June 2013 with two training systems, spindle and V system and on two rootstocks, M9-NIC29 and Geneva41.
- Plots for the two rootstocks were planted with a randomized block experimental design in each row and within each training system. For the spindle and V system there are two plots per rootstock in each row and a total of seven rows per training system intersected by walkways (Fig. 2 and 3).
- WA 38 spindle trees were planted at 3 ft x 10 ft (1498 trees/acre), while those planted with V system are 1.5 ft x 10 ft (2997 trees/acre, Fig. 3). One-year-old trees from Willow Drive nursery were planted in plots according to the trunk caliper sorting (5/8", 1/2", 3/4").
- An irrigation system was set up with drippers to optimize the water and fertilizer application. No cooling system net cover has yet been established.
- The inter-rows are covered with grass.
- A further four rows of trees with the same scion-rootstock combinations have been planted adjacent to the others.

	Spindle/ M9 11 trees (10 m)	Spindle/ M9 11 trees (10 m)	Spindle/ M9 11 trees (10 m)	Spindle/ G41 11 trees (10 m)	Spindle/ M9 11 trees (10 m)	Spindle/ M9 11 trees (10 m)	Spindle/ G41 11 trees (10 m)	V/G41 20 trees (10 m)	V/M9 20 trees (10 m)	V/G41 20 trees (10 m)	V/M9 20 trees (10 m)	V/M9 20 trees (10 m)	V/G41 20 trees (10 m)	V/M9 20 trees (10 m)
	2 m													
BL 1 (5/8')	Spindle/ G41 11 trees (10 m)	Spindle/ M9 11 trees (10 m)	Spindle/ G41 11 trees (10 m)	Spindle/ M9 11 trees (10 m)	Spindle/ G41 11 trees (10 m)	Spindle/ M9 11 trees (10 m)	Spindle/ M9 11 trees (10 m)	V/G41 20 trees (10 m)	V/G41 20 trees (10 m)	V/M9 20 trees (10 m)	V/G41 20 trees (10 m)	V/G41 20 trees (10 m)	V/M9 20 trees (10 m)	V/M9 20 trees (10 m)
2 m														
BL 2 (5/8')	Spindle/ G41 11 trees (10 m)	Spindle/ M9 11 trees (10 m)	Spindle/ G41 11 trees (10 m)	Spindle/ M9 11 trees (10 m)	Spindle/ G41 11 trees (10 m)	Spindle/ M9 11 trees (10 m)	Spindle/ M9 11 trees (10 m)	V/M9 20 trees (10 m)	V/G41 20 trees (10 m)	V/G41 20 trees (10 m)	V/M9 20 trees (10 m)	V/G41 20 trees (10 m)	V/M9 20 trees (10 m)	V/G41 20 trees (10 m)
2 m														
BL 3 (1/2')	Spindle/ M9 11 trees (10 m)	Spindle/ G41 11 trees (10 m)	Spindle/ M9 11 trees (10 m)	Spindle/ G41 11 trees (10 m)	Spindle/ M9 11 trees (10 m)	Spindle/ G41 11 trees (10 m)	Spindle/ M9 11 trees (10 m)	V/M9 20 trees (10 m)	V/G41 20 trees (10 m)	V/G41 20 trees (10 m)	V/M9 20 trees (10 m)	V/G41 20 trees (10 m)	V/M9 20 trees (10 m)	V/G41 20 trees (10 m)
2 m														
BL 4 (1/2')	Spindle/ M9 11 trees (10 m)	Spindle/ G41 11 trees (10 m)	Spindle/ M9 11 trees (10 m)	Spindle/ G41 11 trees (10 m)	Spindle/ M9 11 trees (10 m)	Spindle/ G41 11 trees (10 m)	Spindle/ M9 11 trees (10 m)	V/M9 20 trees (10 m)	V/G41 20 trees (10 m)	V/G41 20 trees (10 m)	V/M9 20 trees (10 m)	V/G41 20 trees (10 m)	V/M9 20 trees (10 m)	V/G41 20 trees (10 m)
2 m														
BL 5 (1/2')	Spindle/ M9 11 trees (10 m)	Spindle/ G41 11 trees (10 m)	Spindle/ M9 11 trees (10 m)	Spindle/ G41 11 trees (10 m)	Spindle/ M9 11 trees (10 m)	Spindle/ G41 11 trees (10 m)	Spindle/ M9 11 trees (10 m)	V/M9 20 trees (10 m)	V/G41 20 trees (10 m)	V/G41 20 trees (10 m)	V/M9 20 trees (10 m)	V/G41 20 trees (10 m)	V/M9 20 trees (10 m)	V/G41 20 trees (10 m)
2 m														
BL 6 (5/8' and 3/4')	Spindle/ M9 11 trees (10 m)	Spindle/ G41 11 trees (10 m)	Spindle/ M9 11 trees (10 m)	Spindle/ G41 11 trees (10 m)	Spindle/ M9 11 trees (10 m)	Spindle/ G41 11 trees (10 m)	Spindle/ M9 11 trees (10 m)	V/M9 20 trees (10 m)	V/G41 20 trees (10 m)	V/G41 20 trees (10 m)	V/M9 20 trees (10 m)	V/G41 20 trees (10 m)	V/M9 20 trees (10 m)	V/G41 20 trees (10 m)
2 m														
BL 7 (5/8' and 3/4')	Spindle/ M9 11 trees (10 m)	Spindle/ G41 11 trees (10 m)	Spindle/ M9 11 trees (10 m)	Spindle/ G41 11 trees (10 m)	Spindle/ M9 11 trees (10 m)	Spindle/ G41 11 trees (10 m)	Spindle/ M9 11 trees (10 m)	V/M9 20 trees (10 m)	V/G41 20 trees (10 m)	V/G41 20 trees (10 m)	V/M9 20 trees (10 m)	V/G41 20 trees (10 m)	V/M9 20 trees (10 m)	V/G41 20 trees (10 m)
2 m														
ROW 1	44 trees													
ROW 2														
ROW 3														
ROW 4														
ROW 5														
ROW 6														
ROW 7														
ROW 8														
ROW 9														
ROW 10														
ROW 11														
ROW 12														
ROW 13														
ROW 14														

Figure 1: Sunrise and Roza orchards: first seven rows WA38/M9-NIC29 or WA38/Geneva41 trained as spindle and other seven rows with same rootstock combinations trained as V system.



Figure 2: Sunrise orchard in September 2013; detail of the walkways (on the left) and of the trellis in V system and spindle (on the right).



Figure 3: Sunrise orchard in September 2013; plot of WA38/M9-NIC29 at spindle (on the left) and the same combination in V system (on the right).

❖ Roza orchard:

The same experimental design within each row and training system describe above was used in Roza orchard and the planting was made in June 2013 with trees with the two rootstocks mentioned above and trees coming from the same nursery. The trellis structure in Prosser was completed with six wires at equal distance (Fig. 4).



Figure 4: WA38 V trained, Roza, Prosser (September 2013).

RESULTS & DISCUSSION

The two rootstocks were chosen among all those available for their different features. M9-NIC29 is known as the most vigorous clone of M9 and is suggested for Honeycrisp and other low vigor varieties. Geneva41 is more dwarfing, tolerant to root rot, resistant to cold, replant disease, fire blight and woolly aphid (Robinson et al., 2003).

WA 38 is a type 4 habit apple (according to the Lespinasse scale): it produces in the outer part of the canopy mainly in brindle and 2-3 year old branches, Fig. 5 (Sunrise). We have noticed that this variety tends to have “blind wood” after planting. This aspect can be managed but needs to be optimized.



Figure 5: Pictures of WA 38: detail of over 4” long “blind wood” (September 2013).

- Long feathers developed at Sunrise 4 months after planting.
- In this case of bi-axis, a head back cut at 2 ft from the ground was made in order to build a two leaders system by selecting two new branches to become the axes of this trellis. The bi-axis trees planted along the row will produce a flat canopy or fruiting wall, which will more easily allow the use of mechanized management in the orchard (Fig. 6).



Figure 6: WA 38 trained as a bi-axis in Sunrise (September 2013).

Literature:

- Lespinasse J.M., 1980. La conduite du pommier II- L' Axe Vertical, La R novation Des Vergers. I.N.V.U.F.L.E.C. Paris.
- Robinson T., Aldwinckle H., Fazio G., and Holleran T., 2003. The Geneva Series of Apple Rootstocks from Cornell: Performance, Disease Resistance, and Commercialization. Acta Hort., 622:513-520.

EXECUTIVE SUMMARY

Two one-acre blocks of WA 38 have been planted at the Sunrise (Wenatchee) and Roza (Prosser) orchards, using two different rootstocks (M9-NIC29 and Geneva41). Trees were established as spindle, V trellis and to make bi-axis trees in randomized replicated blocks for each WA38/rootstock combination. With these two orchards, it will be possible to evaluate the territorial suitability of WA 38 in different levels of soil fertility. A training systems and rootstock trial for this newly released and promising variety will provide information to the growers of Washington on how to manage WA 38 and optimize fruit quality and profitability.