

Contract #18-13-074

ShillingBridge Root Stock Grafting Project

Grant Amount

\$2,500

Contact

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Issue of Interest

The Nebraska grape and wine growing industry is relatively young. Early vineyard plantings focused on hardy cultivars (varieties) that were considered “easy” to grow in our continental climate. Many vineyards consist of small numbers of several different cultivars. Unfortunately, many of these cultivars have fruit characteristics that make it difficult to produce quality wine. When the industry started, the novelty of a “Nebraska Wine” was adequate to sell the product, but as the industry matures, wine quality will be the driving force in expanding market share. This will require cultivars better suited to the demands of the marketplace. The time is rapidly approaching when many of these early cultivars will have to be replaced with cultivars that have greater value to the winery and the consumer. Pulling up and replanting an existing vineyard would involve considerable labor and input costs, as well as going through three or four years of lost production as the new vines are trained. Grafting onto the mature root systems of existing vines to change cultivars may be more practical with less input cost and a more rapid return to an income producing crop.

Approach to Problem

This project was conducted in the vineyard of SchillingBridge Winery, Pawnee City, in the southeast corner of Nebraska. Row 24, consisting of 62 deChaunac vines, two off-type vines and three blank spaces, was selected to graft to the scion cultivar Pinot Gris. Row 25, consisting of 67 Lacrosse vines was selected to graft to the scion Riesling. Both rows of vines were own rooted, had been planted in 2002, and cropped in 2005, 2006, 2007, and 2008. The University of Nebraska Viticulture Department staff, including Dr. Paul Read and Steve Gamet, provided technical advice. Labor for grafting, care of the vines, and data collection was provided by the SchillingBridge vineyard and grounds crew including Max Hoffman and Kent Niss. Dr. Read, Steve Gamet, Issam Grunfleh, and Christina Huck of the UNL Viticulture program also provided labor for the two days of grafting.

Five hundred buds each of Pinot Gris clone 146 and Riesling clone 12 dormant budwood were sourced from Grey Viticultural Services, Inc., Geyserville, California. Grafting tools purchased included two pruning saws to cut off the top growth, a grafting tool to split and spread the trunk to prepare it for insertion of the scion and a grafting knife to prepare the cut surface of the budwood for grafting. Permacel cloth grafting tape was used to secure the grafts and Treekote pruning and grafting compound was used to protect the graft from desiccation. Double walled grow tubes were used to protect the grafts and bamboo stakes were used to stabilize the grow tubes. An assortment of ties and fasteners typically used in training young vines in a vineyard was also used.

Goals/Achievement of Goals

This study evaluates the suitability of this practice in our Midwest environment using established vines of the cultivars deChaunac and Lacrosse as the rootstock and cleft grafting Pinot Gris and Riesling respectively as the scion cultivars. The study also seeks to quantify the costs involved in making this conversion and supply an educational venue for interested grape growers.

Results, Conclusions, Lessons Learned

Grafting was done on May 11 and May 12, 2009, by a team of four workers. One worker collected data, one prepared the scion buds, and two prepared the trunks, placed, taped then sealed the graft. At the time of grafting, bud break had occurred on both the deChaunac and Lacrosse vines. The two rows of vines to be grafted had not been pruned. New shoot growth was from one to three inches. The trunks selected to receive grafts were sawed off horizontally two to four inches above ground level to facilitate covering the grafts with soil for winter protection. Where two strong trunks were present, one was grafted and the other was left to act as an energy sink to help control vigor. The data recorded at grafting included row and vine number, rootstock cultivar, scion cultivar, a score from one to three of vine size as an indicator of vigor with (one=small, two=medium, three=large) the total number of trunks, and the number of trunks that received grafts. After grafting, those trunks and cordons left ungrafted as energy sinks were pruned to the same bud density as the rest of the vineyard block of the respective cultivar. Grow tubes were installed over the grafts for protection. The grow tubes were taped to bamboo stakes attached to the fruiting wire of the existing VSP trellis for stabilization.

Data was collected on a weekly basis throughout the summer. Scion buds were observed for new growth and scored from one through five, where one appears dead, two appears dormant, three appears swollen, four shows green and five open with shoot growth started. Shoots arising from the scions were evaluated by recording the length of the main shoot.

On November 30th, the unions of those grafts that produced new shoots were covered with soil from within the vine row to a depth above the first two nodes on the new shoot. This was done to protect the graft union from winter injury. This soil will be removed in the spring of 2010.

Results

A total of 62 deChaunac vines were grafted to Pinot Gris scions and 67 Lacrosse vines were grafted to Riesling scions (Table 1). The last evaluation of bud and shoot growth conducted on August 5, 2009, showed 34 deChaunac vines with successful grafts (54.8%) with an average shoot length of 54.4 inches and 40 Lacrosse vines with successful grafts (59.7%), with an average shoot length of 75.8 inches. The last shoot emergence was recorded on July 22 for deChaunac grafts and July 15 for Lacrosse grafts.

- **Table 1:** Graft success

<u>DATE</u>	<u>ROW</u>	<u>CULTIVAR</u>	<u>SCION</u>	<u>GRAFT</u>	<u>VINE</u>	<u>A.S.L.</u>
8/5/2009	24	DECHAUNAC	PINOT GRIS	SCION GROWTH	34	54.4
8/5/2009	24	DECHAUNAC	PINOT GRIS	NO SCION GROWTH	28	0.0
8/5/2009	25	LACROSSE	RIESLING	SCION GROWTH	40	75.8
8/5/2009	25	LACROSSE	RIESLING	NO SCION GROWTH	27	0.0

For deChaunac 43 vines had one trunk ungrafted to act as an energy sink and produced 69 pounds of fruit (1.6 pounds per vine), while 19 vines had no top growth. For Lacrosse 39

vines had one trunk ungrafted to act as an energy sink and produced 697 pounds of fruit (17.9 pounds per vine), while 28 vines had no top growth. Fruit production on adjacent blocks of deChaunac and Lacrosse was 8.8 and 20.5 pounds per vine, respectively. A heavy deChaunac crop of 24 pounds per vine in 2008 and an outbreak of Black Rot in 2009 contributed to the low fruit yields in the deChaunac block. Vines with top growth had a higher percentage of successful grafts than those vines without top growth (Table 2). For deChaunac with top growth 28 of 43 (65%), and without top growth 6 of 19 (32%), produced shoots from the graft. For Lacrosse with top growth 25 of 39 (64%) and without top growth 15 of 28 (54%), produced shoots from the graft. Average scion shoot length was less for vines with top growth, than for vines without top growth. Average shoot length for deChaunac with and without top growth respectively, was 50 inches and 74 inches. Average shoot length for Lacrosse with and without top growth, respectively, was 71 inches and 85 inches.

- **Table 2:** Top growth

<u>DATE</u>	<u>ROW</u>	<u>CULTIVAR</u>	<u>UNGRAFTED</u>	<u>VINES</u>	<u>GRAFT</u>	<u>A.S.L.</u>
8/5/09	24	DECHAUNAC	YES	28	SCION GROWTH	50
8/5/09	24	DECHAUNAC	YES	15	NO SCION GROWTH	0
8/5/09	24	DECHAUNAC	NO	6	SCION GROWTH	74
8/5/09	24	DECHAUNAC	NO	13	NO SCION GROWTH	0
8/5/09	25	LACROSSE	YES	25	SCION GROWTH	71
8/5/09	25	LACROSSE	YES	14	NO SCION GROWTH	0
8/5/09	25	LACROSSE	NO	15	SCION GROWTH	85
8/5/09	25	LACROSSE	NO	13	NO SCION GROWTH	0

Vine size at grafting for deChaunac was 17 small, 29 medium, and 16 large, for Lacrosse 8 small, 44 medium, and 15 large (Table 3). Vine size effect on grafting success differed between deChaunac and Lacrosse although medium-sized vines performed best for both cultivars. For deChaunac small vines 10 of 17 (59%), medium vines 20 of 29 (69%), and large vines 4 of 16 (25%) produced shoots with average shoot lengths of 62 inches, 50 inches, and 59 inches, respectively. For Lacrosse, small vines 3 of 8 (37%), medium vines 30 of 44 (68%), and large vines 7 of 15 (47%) produced shoots with average shoot lengths of 51 inches, 79 inches, and 71 inches, respectively.

- **Table 3:** Vine size

<u>DATE</u>	<u>ROW</u>	<u>CULTIVAR</u>	<u>VINE SIZE</u>	<u>VINES</u>	<u>GRAFT</u>	<u>A.S.L.</u>
8/5/09	24	DECHAUNAC	SM	10	SCION GROWTH	62
8/5/09	24	DECHAUNAC	SM	7	NO SCION GROWTH	0
8/5/09	24	DECHAUNAC	M	20	SCION GROWTH	50
8/5/09	24	DECHAUNAC	M	9	NO SCION GROWTH	0
8/5/09	24	DECHAUNAC	L	4	SCION GROWTH	59
8/5/09	24	DECHAUNAC	L	12	NO SCION GROWTH	0
8/5/09	25	LACROSSE	SM	3	SCION GROWTH	51
8/5/09	25	LACROSSE	SM	5	NO SCION GROWTH	0
8/5/09	25	LACROSSE	M	30	SCION GROWTH	79
8/5/09	25	LACROSSE	M	14	NO SCION GROWTH	0
8/5/09	25	LACROSSE	L	7	SCION GROWTH	71
8/5/09	25	LACROSSE	L	8	NO SCION GROWTH	0

Input costs for this project included a one-time purchase of specialized grafting tools, plant materials, grafting supplies, and vineyard supplies to support and train the new growth (Table 4). Grafting tools used were pruning saws, a grafting tool for splitting the trunk, and a Tina 605 grafting knife to make the scion wood cuts. One bundle each of Pinot Gris clone 146 and Riesling clone 12 budwood was purchased. Each bundle contained 100 five-bud dormant cuttings. Four rolls of cloth grafting tape and two quarts of Treekote grafting compound were purchased. One bundle of bamboo stakes was purchased to support grow tubes and new shoot growth. Miscellaneous vine training ties and materials were also purchased. Grow tubes used to protect the new grafts and T-tape for irrigation backup were supplied by SchillingBridge Vineyard.

- **Table 4:** Supplies and Material Costs

<u>CATEGORY</u>	<u>DATE</u>	<u>ITEM</u>	<u>PER UNIT</u>	<u>UNITS</u>	<u>COST</u>
Grafting tools	3/07/09	Tina 605 Grafting Knife	69.00	1	\$ 69.00
	3/17/09	Grafting Tool	30.85	1	\$ 30.85
	3/07/09	Pruning Saw	26.00	2	\$ 2.70
				Sum	\$ 152.55
Plant Material	3/31/09	Budwood, Pinot Gris	0.25	500	\$ 125.00
	3/31/09	Shipping	0.00	0	\$ 16.33
	3/31/09	Budwood, Riesling	0.25	500	\$ 125.00
				Sum	\$ 266.33
Supplies	3/07/2009	Ag Tyes	0.00	1,000	\$ 48.00
	3/07/2009	Bamboo 7x1/2	0.33	250	\$ 82.50
	3/07/2009	Branch Locks	0.04	500	\$ 18.50
	3/07/2009	Tapner Blades	0.00	1	\$ 5.20
	3/07/2009	Tapner Staples	0.00	1	\$ 31.00
	3/07/2009	Tapner Tape	1.00	12	\$ 13.20
	3/17/2009	Grafting Tape	9.30	4	\$ 37.20
	3/17/2009	Treekote, 1 qt	11.70	2	\$ 23.40

6/04/2009	T-tape	0.08	1,072	\$ 85.76
5/07/2009	Paint	4.29	1	\$ 4.29
5/07/2009	Paint Brush	1.29	1	\$ 1.29
5/07/2009	Sales Tax	0.00	0	\$ 1.93
5/07/2009	Tape	3.49	4	\$ 13.96
5/07/2009	Trowel	7.99	1	\$ 7.99
5/11/2009	Grow Tubes	0.73	140	\$ 102.20
3/17/2009	Shipping	0.00	0	\$ 11.19
			Sum	\$ 487.61

Travel expense

5/11/2009	Mileage - UNL	0.50	153	\$ 76.50
5/12/2009	Mileage - UNL	0.50	154	\$ 77.00
			Sum	\$ 153.5

Grand Total \$1,059.99

Labor for this project totaled 104.5 hours and was valued at \$20 per hour (Table 5). Grafting time for 129 vines was 29.5 hours, which breaks down to a three-person team grafting one vine every 4.6 minutes for a total of 13.7 minutes labor per vine. Care and training of the young vines during the first growing season totaled 25.5 hours, for a total of 11.8 minutes per vine. 34.5 hours was spent collecting and recording data and 15 hours was allotted for travel of university workers between Lincoln and the vineyard site.

- **Table 5:** Labor costs

<u>TASK</u>	<u>DATE</u>	<u>HOURS</u>	<u>LABOR COST</u>
Data Collection	6/25/2009	2	\$ 40.00
	5/07/2009	5.5	\$ 110.00
	5/12/2009	4	\$ 80.00
	6/24/2009	2	\$ 40.00
	7/01/2009	2	\$ 40.00
	7/08/2009	2	\$ 40.00
	7/15/2009	2.5	\$ 50.00
	7/22/2009	2	\$ 40.00
	7/29/2009	2	\$ 40.00
	8/05/2009	2	\$ 40.00
	5/11/2009	6.5	\$ 130.00
	6/17/2009	2	\$ 40.00
	Sum	34.5	\$ 690.00

Graft Protection by Mounding

11/30/2009	2	\$ 40.00
Sum	2	\$ 40.00

Grafting

5/11/2009	8	\$ 160.00
5/12/2009	2.5	\$ 50.00
5/11/2009	5	\$ 100.00
5/11/2009	5	\$ 100.00
5/12/2009	2.5	\$ 50.00
5/12/2009	4	\$ 80.00
5/12/2009	2.5	\$ 50.00
Sum	29.5	\$ 590.00

Install Grow Tubes

5/21/2009	5	\$ 100.00
5/14/2009	3	\$ 60.00
5/18/2009	3	\$ 60.00
Sum	11	\$ 220.00

Remove Grow Tubes

7/29/2009	1	\$ 20.00
Sum	1	\$ 20.00

Spray With Sevin

6/10/2009	1	\$ 20.00
Sum	1	\$ 20.00

Sucker and Collect Data

5/26/2009	1	\$ 20.00
6/03/2009	2	\$ 40.00
6/10/2009	2	\$ 40.00
Sum	5	\$ 100.00

Travel

5/12/2009	3	\$ 60.00
5/12/2009	3	\$ 60.00
5/12/2009	3	\$ 60.00
5/11/2009	3	\$ 60.00
5/11/2009	3	\$ 60.00
Sum	15	\$ 300.00

Trellis Clearing	5/14/2009	5	\$ 100.00
	Sum	5	\$ 100.00
Vine Training	8/05/2009	0.5	\$ 10.00
	Sum	0.5	<u>\$ 10.00</u>
	Grand Total	104.5	\$2,090.00

Progress According to Outcome Measures

A long-term goal of this project is to determine the suitability of hardy hybrid wine grapes (deChaunac and Lacrosse) that may have lower fruit value, because of fruit quality issues related to wine quality, to act as rootstock for higher value scion cultivars. The first growing season reported here is just the first step in the process. It proves that deChaunac and Lacrosse will accept grafts of scion cultivars. The survival of grafts through winter and future growing seasons, the length of time to fruiting by the scion cultivars, and the affects of the rootstock cultivars on vigor and production characteristics of the scion cultivars are all subjects for future years of this project. Another goal is to provide economic information allowing growers to make an informed business decision. This report gives some base values on costs and labor requirements they can start from. The third goal was to provide an educational venue for this practice. This site will be made available for educational field days to the UNL Viticulture program.

Overall, this has been a very interesting and educational project through the first growing season. Not everything went as planned but results were good enough to consider it a success. I would like to thank the Nebraska Grape and Winery Board for their support.