Cordon Trellis Method for Currants and Gooseberries

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In Wisconsin and adjacent states, currants and gooseberries (two closely related fruit crops) are generally grown without trellises, as extension publications recommend. However, in untrellised plantings harvest is very time-consuming, fruit size is small, fruit often lay on the ground causing them to rot or be dirty, and weed control is complicated. In the Netherlands, where there is a large commercial gooseberry and currant industry, fresh-market growers use a cordon trellis system to train their plants. In this system, each plant is trained to 1-3 permanent vertical stems (the "cordons"), with fruit borne on short branches from the cordons. The fruiting branches are replaced annually. This method requires extra labor and cost to establish a trellis and train the plants, but it reportedly reduces the labor needed for harvest and weeding, keeps fruit off the ground, and increases fruit size and quality. However, the cordon trellis system is not well known in the United States and it has not been systematically trialed here.

Steven Mackay, then with Cornell Cooperative Extension in New York State, travelled to the Netherlands in the early 2000's to learn about the cordon trellis method used there. His observations were published in the New York Fruit Quarterly Summer 2005 issue, available online at https://nyshs.org/summer-2005/, and we recommend that article to anyone interested in the technique.

On our farm we have raised trial plantings of four currant varieties and four gooseberry varieties using both cordon-trellised and untrellised systems. Our goals were to compare the material costs, labor time, and yield for both systems. This report summarizes our observations during four growing seasons from 2020-2023.

Experimental Design and Field Layout. This research was conducted using organic growing methods on our certified organic farm in Belmont, Lafayette County, Wisconsin. The soil type is an Ashdale silt loam. Pre-plant soil tests at Univ. of Wisconsin Soil and Forage Analysis Lab showed that soil pH was 6.9, with an organic matter content of 5.3%, and that phosphorous and potassium levels were excessive (likely due to heavy manure applications in past decades).

We planted eight rows, each 300' long: four rows of currant and four of gooseberry. Each row had six feet of border plants at each end, from which data was not collected. The remaining 288' of each row was divided into 12 plots, each 24' long. The entire experimental area was divided into 3 equal sized blocks based on topography and fertility differences, with one-third of each row in each block, as shown in Table 1. We planted four varieties each of currant and gooseberry, shown in Table 2. We chose these varieties for fresh market growing based on our past experience and recommendations from nurseries, researchers, and other growers in the Upper Midwest. There were two experimental treatments: cordon-trellised and untrellised. Within each block, varieties and treatments were assigned randomly to plots. For each crop, there were 48 plots (16 plots per block). Each combination of variety and treatment was represented twice in each block.

Rows were spaced 10' apart, with a 4' sod aisle (creeping red fescue and white clover) between rows. After planting the berry plants, we laid a three-foot wide, 3.2 oz/square yard, woven landscape fabric on each side of each row (for weed control) and anchored it with sod staples, forming a mulched strip six feet wide in total. We laid a 15 mil drip tape along each row on top of the landscape fabric. Plants were planted 3 feet apart in untrellised plots and eighteen inches apart in trellised plots.

Commercial availability of *Ribes* planting stock is limited, and we were forced to obtain our stock from two different sources, as shown in Table 2. We purchased Black Velvet and Captivator gooseberries as bareroot bushes from Indiana Berry and Plant Company, but we purchased the other six varieties as plugs from Nourse Farms. The plugs from Nourse Farms were much smaller than the bareroot plants from Indiana Berry; and we received and planted the Nourse plants several weeks later than those from Indiana Berry and Plant Company. The Black Velvet and Captivator plants remained larger than the other gooseberry varieties throughout the course of the trial.

Table 1. Experimental Plot Layout (Not to scale). Each plot is 24' in length, with the exception of border plots at the end of rows, which are 6' in length. The abbreviation in each cell refers to the variety (B=Blanka, JVT=Jonkheer van Tets, PC=Pink Champagne, R=Rovada, BV=Black Velvet, CAP=Captivator, HR=Hinnomaki Red, TIX=Tixia) and treatment (T=Trellised, UT=Untrellised)

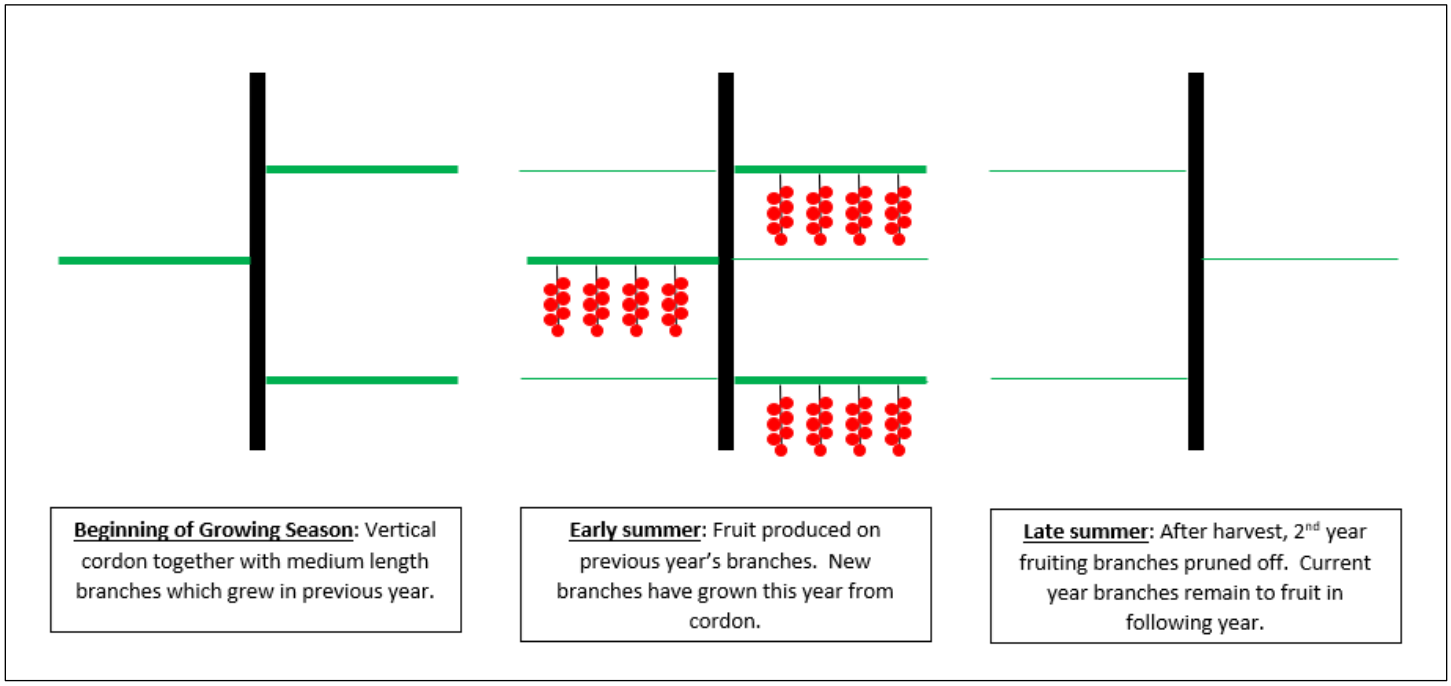
Row:	Crop:		Block 1				Block 2				Block 3				
1	Currant	Border	PC-T	B-UT	PC-T	JVT-UT	B-UT	PC-T	R-T	R-UT	JVT-UT	R-T	JVT-T	PC-T	Border
2		Border	B-T	R-UT	B-T	PC-UT	JVT-UT	PC-UT	PC-UT	JVT-T	R-UT	R-T	PC-UT	B-UT	Border
3		Border	R-T	PC-UT	B-UT	R-UT	B-T	R-T	R-UT	PC-T	JVT-T	B-T	R-UT	JVT-UT	Border
4		Border	JVT-T	R-T	JVT-T	JVT-UT	B-T	JVT-T	B-UT	JVT-UT	B-UT	PC-T	PC-UT	B-T	Border
5	Gooseberry	Border	BV-T	HR-T	HR-T	BV-UT	HR-T	CAP-T	TIX-UT	CAP-UT	HR-T	TIX-UT	BV-UT	TIX-UT	Border
6		Border	TIX-UT	CAP-T	TIX-UT	CAP-UT	BV-T	BV-UT	TIX-T	BV-T	BV-T	BV-T	CAP-T	HR-UT	Border
7		Border	HR-UT	TIX-T	HR-UT	BV-UT	CAP-UT	HR-UT	CAP-T	HR-T	HR-T	TIX-T	CAP-T	CAP-UT	Border
8		Border	BV-T	TIX-T	CAP-UT	CAP-T	TIX-T	HR-UT	BV-UT	TIX-UT	TIX-T	BV-UT	CAP-UT	HR-UT	Border

Table 2. Varieties Grown in our Trial

Crop	Variety	Source	Material	Date Planted In Field
Gooseberry	Black Velvet	Indiana Berry & Plant Company	Bareroot bush	4/22/2020
	Captivator	Indiana Berry & Plant Company	Bareroot bush	4/22/2020
	Hinnomaki Red	Nourse Farms	Small Plug	5/13/2020
	Tixia	Nourse Farms	Small Plug	5/13/2020
Currant	Blanka	Nourse Farms	Small Plug	5/13/2020
	Jonkheer van Tets	Nourse Farms	Small Plug	5/13/2020
	Pink Champagne	Nourse Farms	Small Plug	5/13/2020
	Rovada	Nourse Farms	Small Plug	5/13/2020

Trellis Construction and Plant Training. The overall premise of the cordon trellis system is that each plant is trained to one or more permanent vertical stems (the cordons). Fruit are produced on short horizontal branches off the cordon.

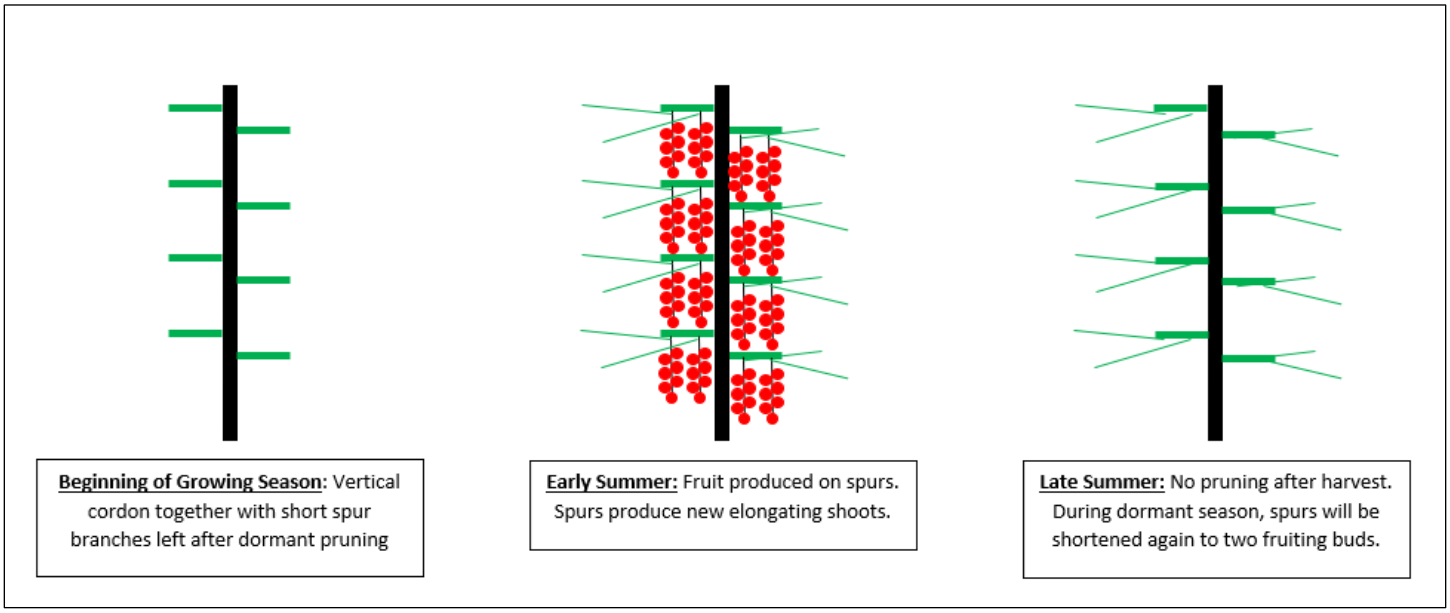
There are two main methods for pruning currants and gooseberries: the English and Dutch techniques. In the Dutch technique, fruit are produced on longer horizontal branches which grew from the cordon in the previous year. Immediately after harvest, these fruiting branches are pruned off, and new branches will fruit in the following year.



Dutch Pruning Technique

Fruiting branch of Captivator Gooseberry pruned with Dutch technique. Notice long fruiting branches.

In the English technique, all branches are cut back to several inches in length during dormant pruning, and these short branches produce fruit each year.



English Pruning Technique

Trellised currants immediately after dormant pruning using the English technique. Notice the numerous, short, stub-like branches which will produce fruit this year. Photo courtesy of Jason Fischbach, UW-Extension.

We used the Dutch pruning technique in our study, and we also followed the standard Dutch practice of training gooseberry plants to a single cordon, but currant plants to three cordons.

Untrellised and trellised currant plants, June 2021

Trellised Jonkheer von Tets Currant plants after pruning, June 4, 2021. Note absence of branches below bottom wire and cordons trained to bamboo stakes.

We constructed our trellis in June 2020, after planting, using Best Angle brand angle iron stakes (1-1/2” wide x 1-1/2” wide x 8’ tall; Best Angle model PB496-OR) each driven 2.5 feet into the ground and spaced six feet apart within the row. Two rows of 12.5 gauge high-tensile wire ran down the row, one about 5-1/2 feet above the ground, and the other at six inches above the ground, and were fastened to the stakes with wire ties. At each end of each row, the trellis was braced with an angled stake and a ground screw as shown in Figure 1. At the location of each vertical cordon, a vertical 1/2-inch bamboo stake was placed between the two wires and fastened to the wires using size 1 pole clips (purchased from Peach Ridge Orchard Supply). We fastened the cordons to the bamboo stakes using plant tie tape applied with a Max-Tapener tool.

Pole clips to attach bamboo stake to 12.5 gauge trellis wire. Photo courtesy Peach Ridge Orchard Supply

Young Rovada currant plant taped to bamboo stake using plant tie tape applied with max tapener

Trellis Construction, showing one end of a row of trellised gooseberry plants. Trellis for currant plants is identical except there are three bamboo stakes per plant, and each plant has three upright cordons, one trained to each stake.

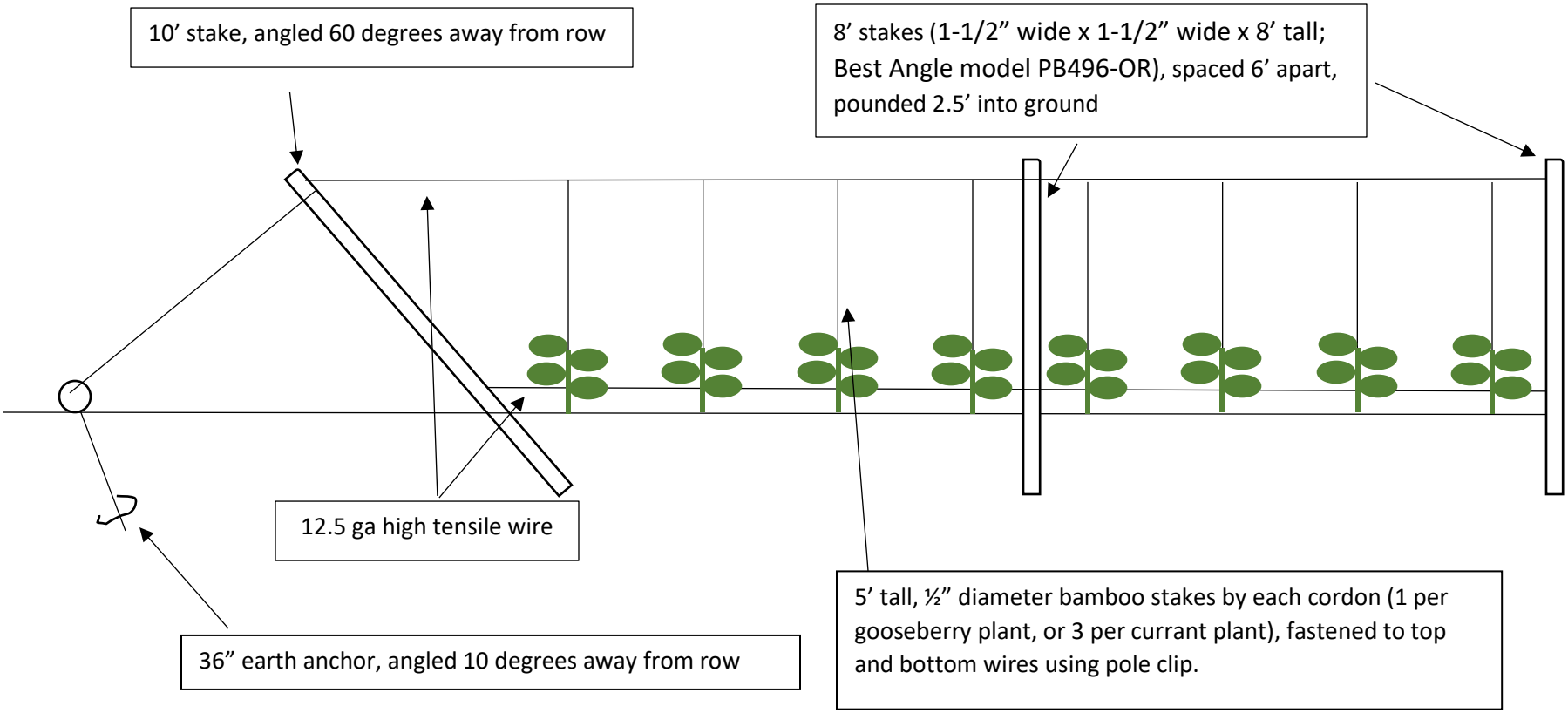


Table 3 shows the specific dates and activities performed during the first four growing seasons. In trellised plots, the overall goal was to develop the vertical cordons and allow branches to grow from the cordons, while removing any new shoots which originated near the soil surface and devigorating or removing long branches off the cordon which competed with the cordon leader.

Table 3. Training and trellising activities performed in 2020-2023

Date	Which Plantings	Activity
4/27/2020	Trellised Gooseberry	Black Velvet and Captivator gooseberries only: Shortly after planting, pruned to 1 cordon (vertical stem) per plant and remove any larger branches from the cordon (but left very short branches)
6/2/2020	Trellised Currants	Pruned to four shoots per plant (three cordons plus one backup shoot)
6/4/2020	Trellised Gooseberry	On Black Velvet and Captivator, pruned off any new shoots competing with the cordon. Tixia and Hinnomaki Red plants were barely breaking bud at this time.
7/2/2020	Trellised Currant & Gooseberry	Tied cordons to bamboo stakes.
7/6/2020	Trellised Gooseberry	Black Velvet and Captivator gooseberries only: Pruned off vigorous shoots originating below or near the soil surface.
7/21/2020	Trellised Currant & Gooseberry	Tied cordons to bamboo stakes.
8/11/2020	Trellised Currant & Gooseberry	Tied cordons to bamboo stakes.
8/11/2020	Trellised Gooseberry	Pruned off vigorous low branches originating near the soil surface that were competing with cordon; also tipped back upper branches competing with leader.
8/17/2020	Trellised Currant	Pink Champange had many vigorous branches growing from the cordons. We cut back these branches to short stubs
4/3/2021	Trellised Currant	Currants: Pruned off 4th (extra) cordon where it was present
5/25/2021	Trellised Currant	Currants: Pruned to 3 cordons per plant and removed all other long branches originating below bottom wire. Some shoots were up to 8-16” long at this point and should have been pruned earlier.
6/1/2021	Trellised Gooseberry	Gooseberries: removed all elongated branches originating below bottom wire. Taped cordons to stakes and removed vigorous upper branches which were competing with cordon leader.
6/1/2021	Trellised Currant	Taped cordons to stakes, removed vigorous upper branches from the cordons which were clearly competing with the cordon leader, or devigorated those branches by bending them down aggressively so that they cracked slightly at the base but did not break off. Follow-up observations in 2022 showed that these broken branches did develop into weak, devigorated, fruiting branches,
6/29/2021	Trellised Currant	Cut off branches originating below bottom wire, tied cordons to stakes
8/2/2021	Trellised Gooseberry	After harvest was complete, pruned off all branches with >6” of 2nd year growth (i.e., growth made in 2020), leaving a dormant bud at the base of the branch or

		a weak secondary branch of current year's growth (i.e., a branch which had grown in 2021).
4/4/2022	Untrellised Currant	Pruned. Although the general goal in pruning bush currants is to prune to 4 shoots each of 1, 2, and 3 year ages, in this pruning we mainly removed canes and secondary branches which were lying prostrate on the ground. Rovada plants were small with a few generally upright canes and little secondary. branching. Jonkheer van Tets planted had few canes, often prostrate, with very long and well developed secondary branches. Blanka plants had few canes, often prostrate, and mod-high secondary branching. Pink Champagne plants had many long canes, and many secondary branches.
4/8/2022	Trellised Currant	Pruned. Singulate forked branches where needed. Cur back long branches to 10-12" length, shorter if they were competing with cordon in height. Remove or tipped back low, drooping branches so they were not close to the ground. Removed some branches in Jonkheer van Tets because of high branch density – but observations in 2022 suggested that we should have removed more – canopy density was high in 2022 and there was little new branch growth from portions of the cordons which grew in 2021. Removed new canes as needed and singulated cordon leader when it was forked. Extent of branching varied among varieties, with Jonkheer van Tets having the most branches and Rovada the least.
4/13/2022	Untrellised Gooseberry	Pruned off dead canes (mostly present on Black Velvet. Pruned off canes lying on ground, sometimes leaving the base of the branch base up to a vigorous upright secondary branch. We did leave some canes lying on bare ground between strips of landscape fabric, where the canes were rooting. In plants with dense canopies, pruned off secondary branches or occasional entire weak cane.
4/13/2022	Trellised Gooseberry	Pruned off suckers and branches below bottom wire. Cut back occasional upper branch competing with cordon leader. Tipped back low branches lying on ground. Hinnomaki Red suckers heavily from ground and requires more pruning.
5/24/2022	Trellised Currant	Pruned low branches and and new canes below the bottom wire. Blanka produces few new shoots from the crown of the plant. Jonkheer Van Tets has shorter low branches than other varieties and few new shoots from the crown. Pink Champagne has many shoots below wire, growing both from the crown and from the base of cordons, but few long branches above the bottom wire. Rovada has many low branches although less than Pink Champagne.
6/6/2022	Trellised Currant	Tied cordons to stakes. Cracked upright vigorous branches as we did last year on 6/1/2021. Jonkheer van Tets had strong new growth and many upright branches competing with the cordon leader. Rovada had strong vegetative growth. Blanka had very tall cordons. Pink Champagne had weak new growth and few branches competing with the cordon leader.
6/6/2022	Trellised Gooseberry	Tied cordons to stakes. Cracked upright vigorous branches as we did last year on 6/1/2021. Gooseberries in general show vigorous new growth, but have few branches competing with cordon leaders.
7/29/2022	Trellised Gooseberry	After harvest was complete, pruned off all branches with >6" of 2nd year growth, leaving a dormant bud at the base of the branch or a weak secondary branch of current year's growth.
8/1/2022	Trellised Currant	After harvest was complete, pruned off all branches with >4" of 2nd year growth, leaving a ¾" stub at the base of the branch.

4/2023	Untrellised Currant	Pruned. As in 2022, we had to continue to remove canes and secondary branches which were lying prostrate on the ground, especially in Blanka and Pink Champagne.
4/2023	Untrellised Gooseberry	Pruned off dead canes (mostly present on Black Velvet). Pruned off canes lying on ground, sometimes leaving the base of the branch base up to a vigorous upright secondary branch. We did leave some canes lying on bare ground between strips of landscape fabric, where the canes were rooting. In plants with dense canopies, pruned off secondary branches or occasional entire weak cane. Captivator plants had little extension growth form summer 2022 and few new 1-year old canes. Black Velvet had abundant new growth from summer 2022 and many upright canes. Tixia and Hinnomaki Red both prone to mat-like growth habit with many prostrate canes.
4/2023	Trellised Currant	Pruned. Singulated forked branches where needed. Cut back long branches to 10-12" length, shorter if they were competing with cordon in height. Removed or tipped back low, drooping branches so they were not close to the ground. Removed new canes as needed and singulated cordon leader when it was forked. On Pink Champagne, cut occasional low branch originating low on cordon; this variety had few branches on the upper portions of the cordon, and most of these branches were very short. Jonkeer van Tets and Rovada generally had ample branching on the cordon, and on these varieties we thinned branches to 3-4 branches per foot on the cordons, removing longer branches.
4/2023	Trellised Gooseberry	Pruned off suckers and branches below bottom wire. Cut back occasional upper branch competing with cordon leader. Tipped back low branches lying on ground. Hinnomaki Red and Tixia both sucker heavily from ground and require more pruning. These two varieties have weak, short leaders. Captivator has tall cordons with abundant branches and adapts well to cordon trellis method method. Black Velvet has tall cordons, but many plants have died off and this variety is prone to developing very long excessively vigorous, upright branches from the cordon.
5/30/2023	Trellised Currant & Gooseberry	Taped cordons to bamboo stakes and removed strong upper branches competing with the cordon growing point. Tixia required more time than other varieties because it tends to develop many competing branches near the growing point of the cordon in a “witches-broom” type habit.
6/12-6/14/2023	Trellised Currant & Gooseberry	Remove new canes and branches originating below bottom wire. Hinnomaki Red had many more new canes than other gooseberry varieties
8/1/2023	Trellised Gooseberry	After harvest was complete, pruned off all branches with >6” of 2nd year growth, leaving a dormant bud at the base of the branch or a weak secondary branch of current year’s growth.
8/1/2023	Trellised Currant	After harvest was complete, pruned off all branches with >4” of 2nd year growth, leaving a ¾” stub at the base of the branch.

Varietal Differences. We noted significant differences among varieties in their growth habits and amenability to trellising. Among the currants, Blanka plants were tall and readily reached the top wire of the trellis in their second season; however they branched sparsely and some plants were reluctant to produce three strong basal shoots which could be trained as cordons. Jonkheer Van Tets grew vigorously, with strong dominant leaders but also abundant branches. In spring, this variety often grows several upright, nearly vertical branches near the growing tip of the cordon, resulting in a "witches broom" type growth habit. We found that bending these branches down in early June far enough to crack them at the base but not break them off was very effective in devigorating the branches. We also suspect that Jonkheer's cordon branches should be aggressively thinned in dormant pruning to reduce canopy density and shading and also to promote new branch growth, since the cordon trellis method relies on annual growth of branches from the cordon. Pink Champagne grew vigorously in the first season, but in the second and third seasons they flowered heavily and were slow to produce new vegetative growth. Rovada was overall the weakest, least vigorous variety in the first two years but thereafter grew vigorously, although it did not branch abundantly.

Overall, we found Pink Champagne to be very poorly suited to the cordon trellis method because it was reluctant to produce branches from the cordon. The other three varieties were generally amenable to the cordon trellis method, with Jonkheer Van Tests prone to produce too many branches, and Blanka and Rovada tending to produce too few branches.

All currant varieties were susceptible to cordon dieback, where 1-3 cordons on a given plant would die, possibly from disease. In some cases, new shoots grew from the crown of the plant which could be trained as new cordons, but cordon dieback represents a significant loss of yield and lost investment in time and trellising materials.

Pink Champagne Plants on June 5, 2021. Note dense short, spur-like branches on last year's growth, but scarcity of vigorous current year shoots

Pink Champagne plants after dormant pruning in April 2023. Note short cordons and absence of vigorous branches in upper portions of the cordons.

Rovada Currant Plants on June 5, 2021. Note relatively weak, small plants with poorly developed cordons

Rovada after pruning, April 2023. Cordons are now near the top of the trellis.

Dead or dieing cordons in Jonkeer van Tets, June 2023

Jonkheer van Tets plants after delayed dormant pruning in April 2023. Note that cordons have reached top wire of trellis and the abundant branches, including some long lower branches which were cut back.

Among the gooseberry varieties, Hinnomaki Red and Tixia were small, non-vigorous plants. Untrellised, they tended to produce dense, low, mat-like canopies. Trellised, they produced weak, stunted leaders which did not elongate greatly, but they grew new shoots prolifically from the base of the plants. Captivator was extremely vigorous and fruited abundantly. Trellised Captivator plants often reached the top wire in the second season and had abundant long branches. Untrellised plants were dense and large. Black Velvet was somewhat less vigorous than Captivator but grew well. Black Velvet frequently suffered death of branches or entire cordons (perhaps from some unidentified pathogen, or from winter injury). In addition, Black Velvet was prone to developing a few, very long and vigorous branches from the cordon, whereas Captivator tended to produce many approximately evenly sized branches. Overall, we consider Captivator very well suited to the cordon trellis method, Black Velvet moderately well suited, and Hinnomaki Red and Tixia very poorly suited.

Hinnomaki Red Trellised April 2021

Tixia Untrellised April 2021

1 2

Captivator Trellised June 2021

Captivator Untrellised June 2021

Yield. In spring 2020, the year of planting, we removed flowers and developing fruitlets from all plants. Thereafter, fruiting and yield trends were complex and differed by crop, variety, and training method.

Currants, 2021. In 2021, we elected to remove all flowers and developing fruitlets from the currant plants to encourage them to fill their space.

Currants, 2022. In 2022, all four currant varieties yielded 2-4 times as much from trellised plots as from untrellised plots. Blanka and Jonkheer van Tets significantly outyielded Pink Champagne, which in turn significantly outyielded Rovada. Rovada had smaller plants and fewer flowers in spring, so its low yield was not surprising, although the variety is notable for its dense, well-filled strigs of large berries. Pink Champagne flowered very heavily, but set very loose, poorly-filled strigs, and therefore yield was modest.

Currants, 2023. Blanka continued to yield heavily, and trellised plots yield about twice as much as untrellised plots. Yield of Jonkheer van Tets in trellised plots declined dramatically from 2022-2023. We suspect that we left too many branches during 2022 dormant pruning, which resulted in overcropping in 2022 and weakened the plants, causing them to grow few new branches in 2022, which subsequently lead to a small amount of fruiting wood and low yield in 2023. Yield of trellised Pink Champagne plummeted in 2023, probably due to the lack of fruiting branches and the fact that few berries were produced on the ageing cordon. Rovada yield in 2023 was similar to 2022, with trellised plots continuing to far outyield untrellised plots.

In both 2022 and 2023, we believe that the low yield in most untrellised currant plots was due to aggressive removal of low-lying prostrate canes during dormant pruning. This aggressive pruning results in cleaner, more easily-harvestable berries, but probably at the expense of yield. In untrellised plots of all currant varieties, there was a trend towards increased yield between 2022 and 2023, as canopies filled in and there was more fruiting wood.

Gooseberries, 2021. In 2021, we deflowered Tixia and Hinnomaki Red plants, but not Captivator and Black Velvet. The Tixia and Hinnomaki Red plants were very small and we wished to encourage more growth. Although we did not remove flowers or fruits from Black Velvet, the plants set very few fruits and there was no significant harvestable yield. Captivator yielded abundantly in 2021, and we picked 1486 half-pints per acre from untrellised plants and 721 half-pints per acre from trellised plants.

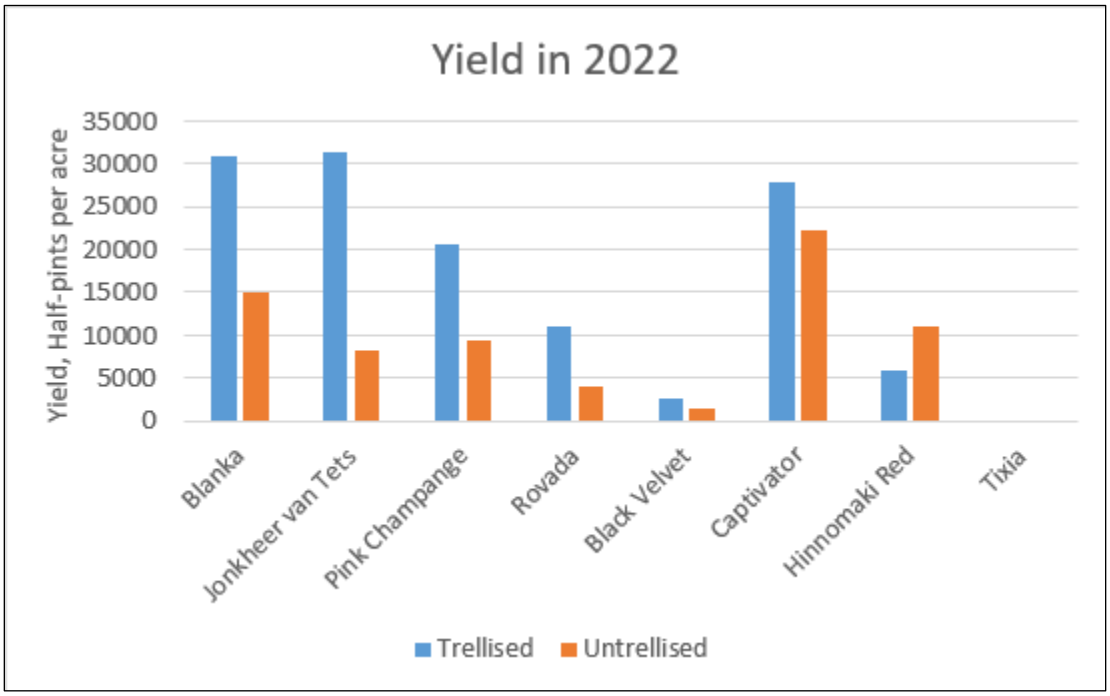
Gooseberries, 2022. Captivator far outyielded the other varieties, with Hinnomaki Red in turn far outyielding Black Velvet, and Tixia produced no significant yield. Overall, we felt that the difference in yield between Captivator and Hinnomaki Red was proportionate to the difference in plant size between the two varieties. The low yield of Black Velvet was surprising, because the plants were large and flowered abundantly, but fruitset was uneven and generally low, with occasional branches setting heavy crops and most branches setting few or no fruit. The effect of trellising method on yield was small and differed by variety: in Captivator, trellised plots outyielded untrellised plots, whereas in Hinnomaki Red the reverse was true.

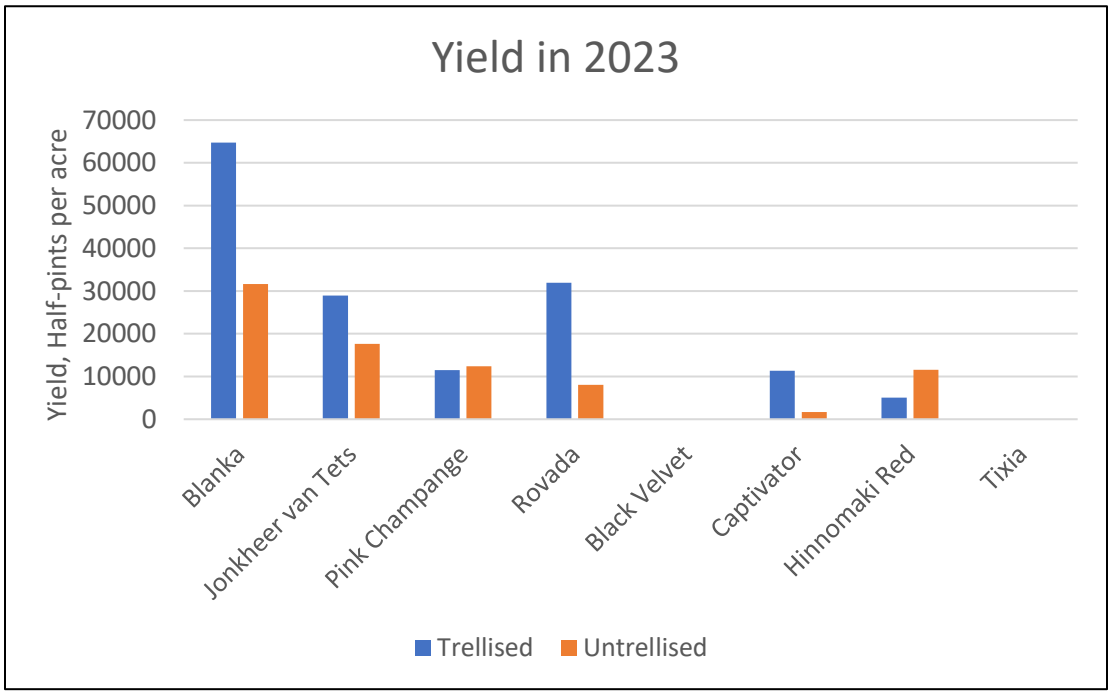
Gooseberries, 2023. Neither Tixia nor Black Velvet produced any significant harvestable yield in 2023. Captivator yields declined steeply from 2021-2022. One possible cause is soil nutrient (nitrogen?) depletion after two consecutive years of high yields – we noticed that Captivator foliage was pale in 2023. Hinnomaki Red yields were similar to 2022, with untrellised plants continuing to outyield trellised plants, presumably because in trellised plots this variety had very short cordons and little fruiting wood.

Ripening Time. In both years we noted more consistent uniform ripening in trellised plants of both crops. This appeared to be because sunlight promotes ripening and trellised plants had smaller canopies with more uniform distribution of light. A notable exception, however, was in currant varieties with longer branches, particularly Jonkeer van Tets, where fruiting branches tended to droop in the summer, shading lower branches and delaying ripening of berries on those branches.

Berries on trellised Captivator plants, showing early uniform ripening

Berries on untrellised Captivator plants, showing late and uneven maturation (photo was taken on the same day as photo to the left)

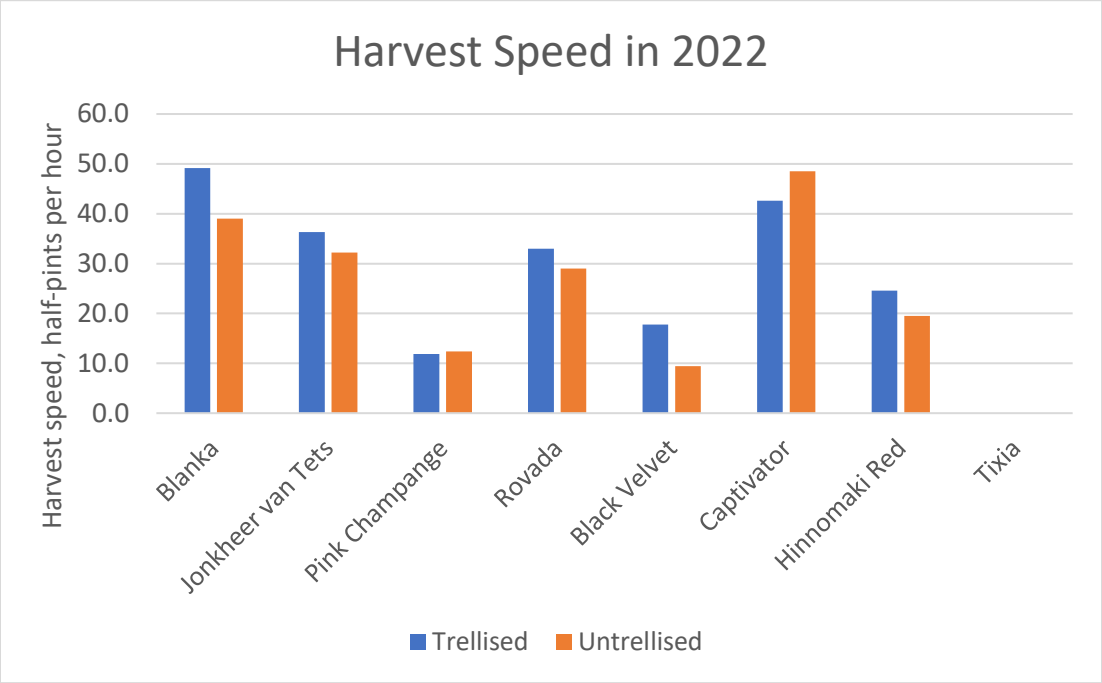

Yield in 2022
Yield, Half-pints per acre
35000
30000
25000
20000
15000
10000
5000
0
Blanka
Jonkheer van Tets
Pink Champange
Rovada
Black Velvet
Captivator
Hinnomaki Red
Tixia
Trellised
Untrellised

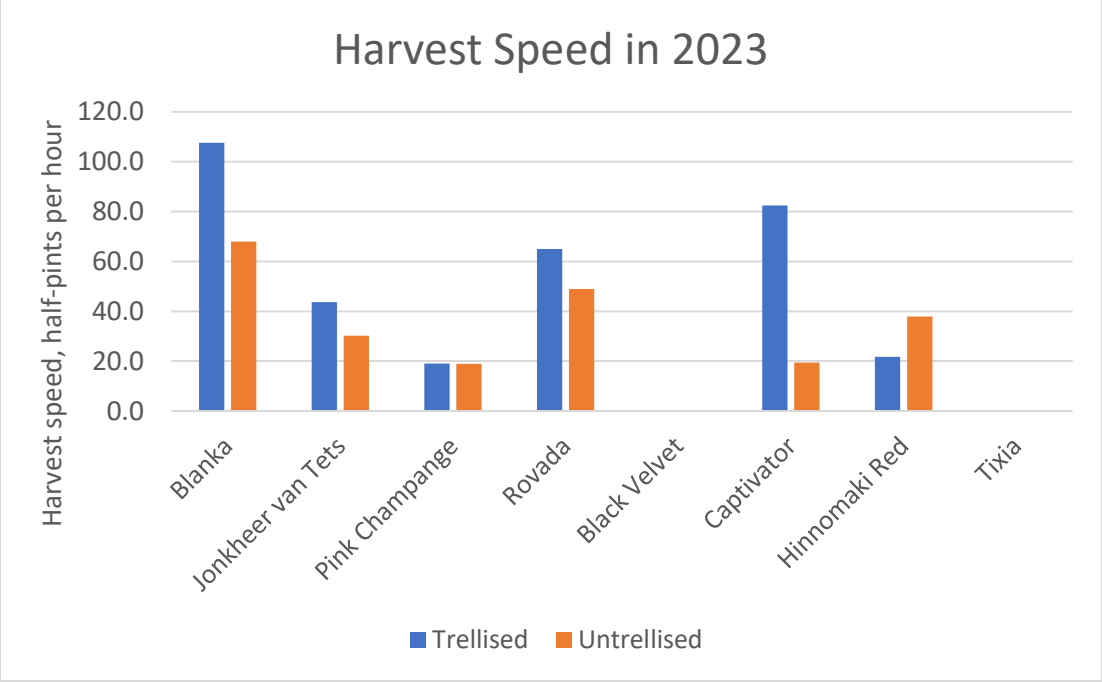

Yield in 2023
Yield, Half-pints per acre
70000
60000
50000
40000
30000
20000
10000
0
Blanka
Jonkheer van Tets
Pink Champange
Rovada
Black Velvet
Captivator
Hinnomaki Red
Tixia
Trellised
Untrellised

Harvest. Pickers enjoyed picking from trellised plants more than untrellised, because the fruit were more accessible within an open canopy on trellised plants, whereas trellised plants bore many of their fruit within a dense canopy. Pickers found untrellised gooseberries particularly unpleasant to harvest because it was difficult to avoid thorns while picking within the dense canopy.

In 2021, harvest of Captivator gooseberries was slightly quicker from trellised plants: we picked 14.1 half-pints per hour from trellised plants, but only 12.2 half-pints per hour from untrellised plants.

In 2022, there were no consistent differences in harvest speed between trellised and untrellised plantings. In 2023, strong differences emerged: harvest was much quicker in trellised plots than in untrellised plots for Blanka, Jonkheer van Tets, Rovada, and Captivator, but not Pink Champagne and Hinnomaki Red.





Other Planting Care. We mowed aisles between the rows approximately weekly during the growing season. We drip irrigated plants as needed. We hand weeded as needed when weeds emerged between the two strips of landscape fabric laid next to each row. Over the course of the trial, there was a clear tendency for weeds to establish near the base of untrellised plants, particularly in the gooseberries, where the dense, plants hid small weeds and thorns deterred workers from zealously searching for weeds. In the trellised plots, workers could easily identify weeds in the rows and weeding was much more thorough. Over many years, we suspect that weed control would be much more successful in trellised plantings, and that perennial weeds would gradually proliferate in untrellised plants (we have in fact observed this trend in older untrellised plantings on our farm and other farms).

We did not apply any soil amendments after planting during this study. However, *Ribes* crops are heavy feeders and will eventually require additional nitrogen. As many growers have noted, it is difficult to apply organic soil amendments such as compost to soil covered by landscape fabric. In theory, in our planting it would be possible to pull back one or both of the landscape fabric strips from each plant row, exposing bare soil and allowing fertilization. In practice, this would be far easier in the trellised plantings, where crop plant stems were not growing over the landscape fabric. This is a potential advantage of trellised plantings.

Pollination. In both years, we placed purchased bumblebee colonies to augment wild pollinators. On 4/7/2021, 2 Natupol Excel Startup bumblee colonies were installed in high tunnels located approximately 200-300 feet away from the *Ribes* planting. *Ribes* bloom began around 4/16/2021. These high tunnels had sidewalls which were opened for ventilation on most days, and bumblebees were frequently seen flying out of the tunnels. On 5/3/2022, 2 quads of bumblebee colonies from Koppert were installed approximately 125' from the *Ribes* planting, and *Ribes* bloom began on 5/7/2022. On 4/28/2023, 2 quads of bumblebee colonies from Koppert were installed approximately 125' from the *Ribes* planting, and *Ribes* bloom began on 4/18/2023, although widespread *Ribes* bloom did not begin until 4/25-4/28/2023. Note that in all years the currants and gooseberries were adjacent to 2 acres of apples whose bloom overlapped with the *Ribes* bloom.

Left: A Koppert bumblebee quad installed in 2022. Right: A bumblebee visiting gooseberry blooms on 5/11/2022

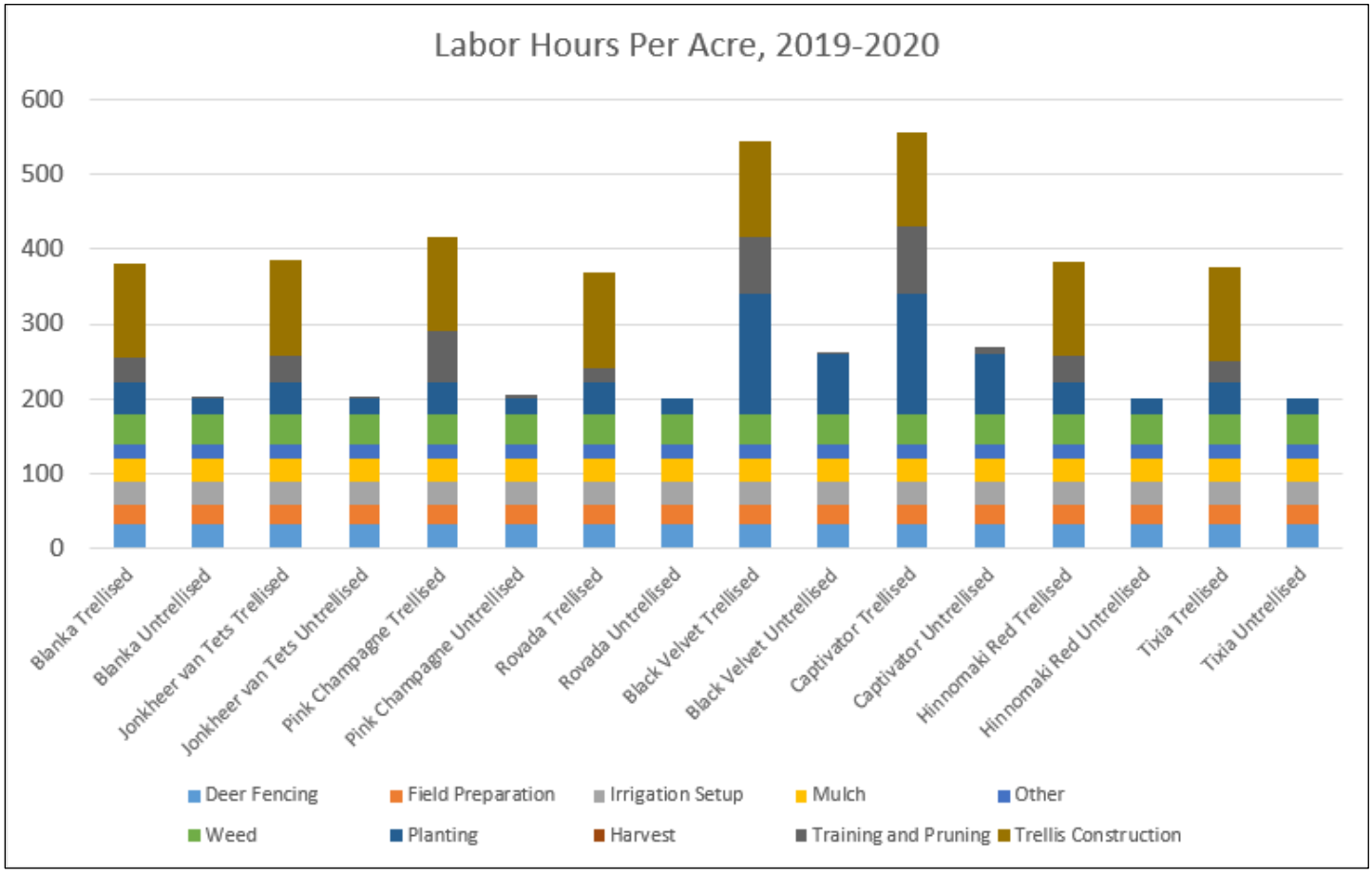
Pests. Anthracnose leaf spot affected all gooseberry varieties, but spotting and defoliation was most severe on Tixia. Hinnomaki Red was the most resistant variety. This disease has been common on our farm and others in the region and it is a major barrier to gooseberry cultivation. A small amount of cluster cup rust was seen on gooseberry plants in spring 2021, but this disease was infrequent and did not appear to significantly affect plant growth. Powdery Mildew infected several currant plants in each year, particularly in the variety Blanka. Currant spanworms were found on June 12, 2020 on several plants purchased from Nourse Farms; these caterpillars hatch from eggs laid on stems the previous year, and the plants were presumably infested while at the nursery in 2019. A spanworm infestation was also noted on a gooseberry plant in June, 2021. Spanworms have been easy to control on our farm with sprays of Dipel. Oblique-banded leafroller larvae were seen feeding on scattered plants in July 2020. A small amount of Japanese beetle damage was noted in July each year.

Cluster Cup Rust lesion on gooseberry leaf

Anthracnose Leaf Spot on Gooseberry

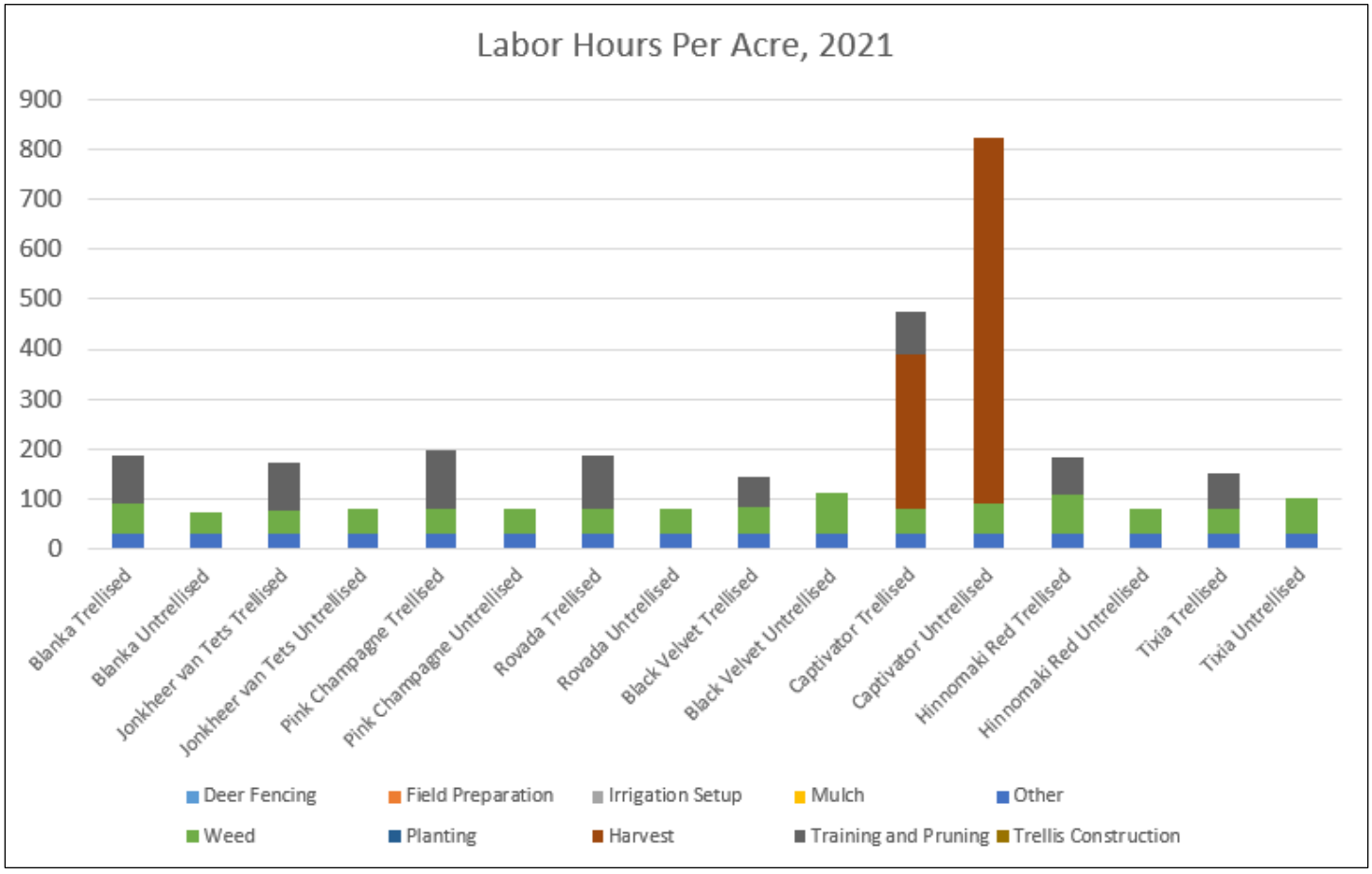
Currant spanworm

Labor and Materials Costs. In 2019-2020 (the year before planting and the year of planting), trellised plantings required about twice as much labor time as untrellised plantings: averaged over all varieties, labor needs were 426 hours per acre in trellised plantings vs 217 hours per acre in untrellised plantings. (For simplicity, we have included the small amount of preplant preparation time spent in 2019 together with time spent in 2020.) The additional labor in trellised plantings was for trellis construction (127 hours per acre), training and pruning plants (averaged 47 hours per acre in trellised plantings, but only 2.6 hours in untrellised plantings), and planting (because the trellis plantings had twice as many plants per acre as the untrellised plants, planting required about twice as much time in the trellised plantings).



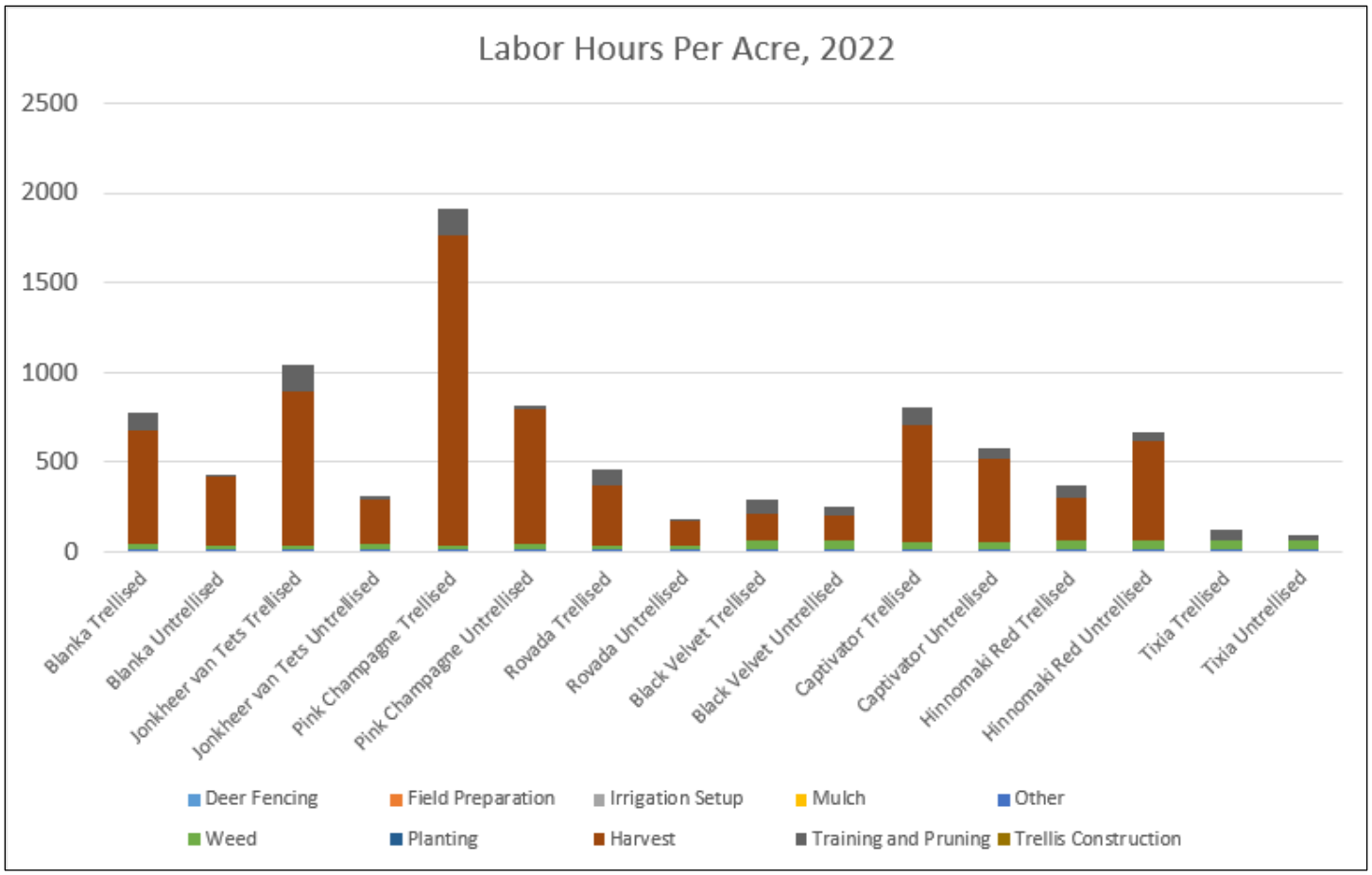
In 2021, trellised plantings continued to require approximately double the time required for untrellised plantings, largely because of time needed for training and pruning, with the exception of Captivator gooseberries. In Captivator, untrellised plantings required more labor because of harvest labor: untrellised Captivator yielded much more than trellised Captivator, and harvesting speed was slightly lower in the untrellised planting.

In 2021, currants required less weeding time than gooseberries (47 hours/acre vs 61 hours/acre). We suspect that the thorny branches on the gooseberry plants made workers slower and more cautious in their work. There was no clear difference between trellised and untrellised plantings in time required for weeding.

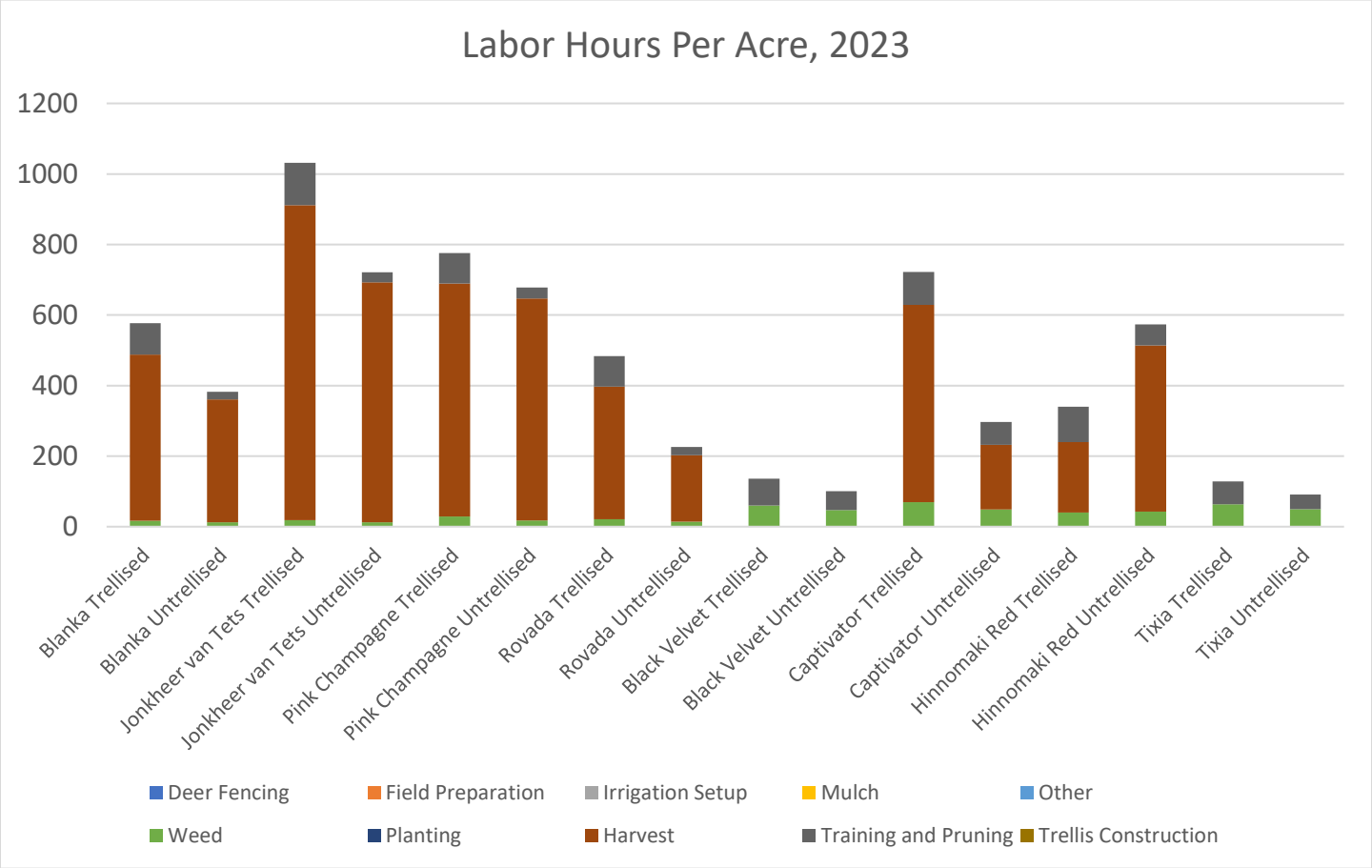


In 2022, total labor needs were largely determined by harvest labor. Plots with higher yields required more labor because of increased harvest labor. Labor required for harvest far exceeded labor required for other tasks, and harvest labor averaged 520 hours per acre. Trellised plantings continued to require more labor in training and pruning (averaged 103 hours per acre in trellised plantings vs 42 hours per acre in untrellised plantings). As discussed above, currants yielded more in trellised than in untrellised plantings, and harvest labor needs were therefore greater in trellised plantings. In the gooseberries, yield patterns were less consistent, but harvest labor time generally was proportionate to yield.

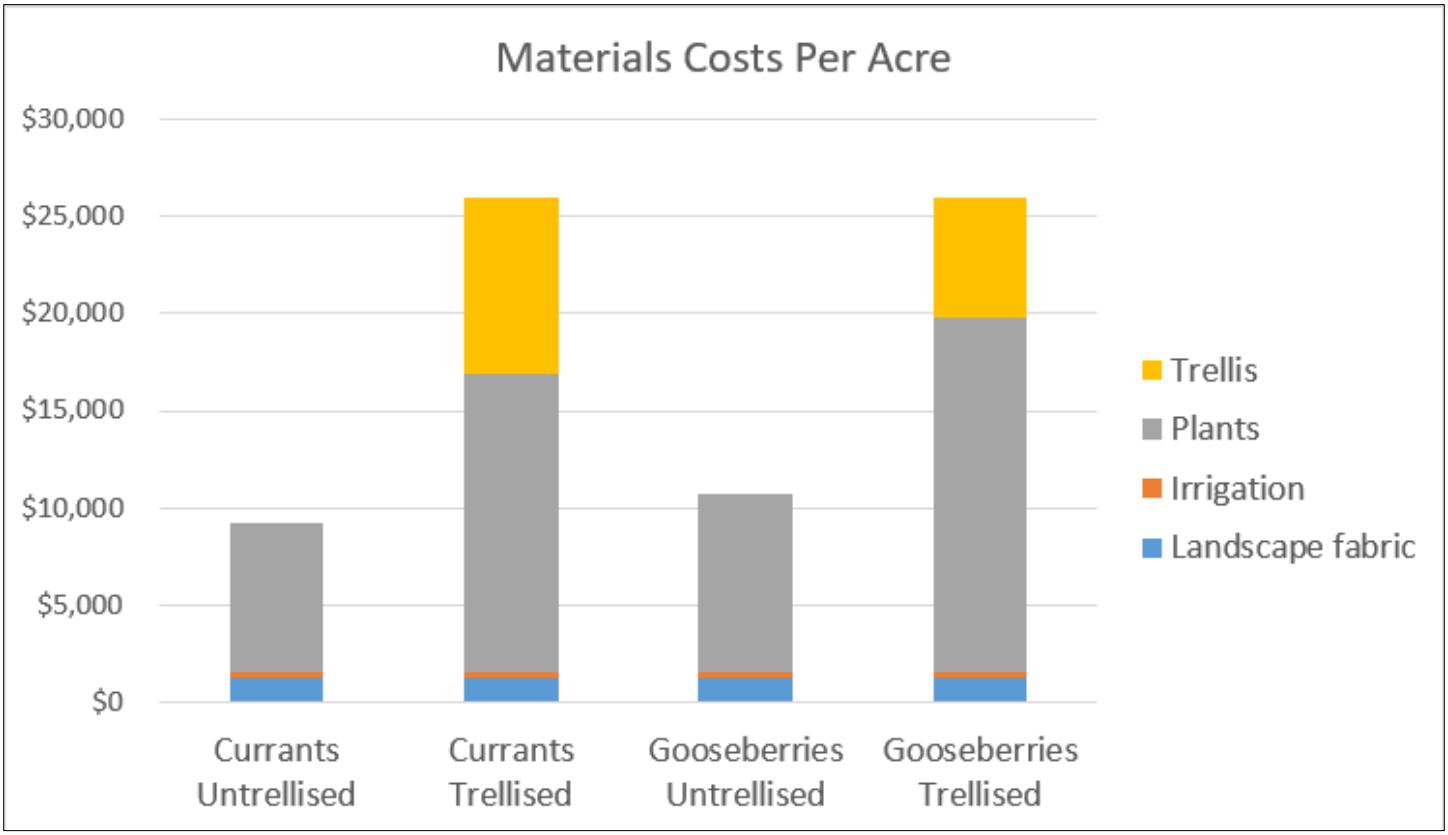
In 2022, currants generally required less weeding time than gooseberries (27 vs. 47 hours/acre), but there was no clear difference in weeding time between trellised and untrellised plantings.



In 2023, harvest labor averaged 470 hours per acre and again far outweighed the labor required for other tasks. Trellised plantings continued to require more labor in training and pruning (averaged 90 hours per acre in trellised plantings vs 41 hours per acre in untrellised plantings). In 2023, currants generally required less weeding time than gooseberries (16 vs. 51 hours/acre), but there was no clear difference in weeding time between trellised and untrellised plantings.



Costs for plants and materials ranged from $9,263-$11,399 per acre in our untrellised plots, but were $23,014-$27,285 per acre in trellised plots; the additional costs in trellised plots was due to the cost of trellis ($6,085 per acre) and the higher cost of plants (an additional $7,665-$9,801 per acre was required to purchase plants in the trellised system because of the higher plant density).



Conclusions and Recommendations. Key findings from our project are:

- Establishment costs for trellised plantings were high. Preplant and year-of-planting labor requirements in trellised plantings were about twice as high as in untrellised plantings (426 hours per acre vs 217 hours per acre). Materials costs (trellis, plants, irrigation supplies, and landscape fabric) were two to three times as high in trellised plantings as in untrellised plantings ($23,000-$27,000 per acre vs $9,000-$11,500 per acre)
- When mature, trellised plantings required 40-60 hours per acre per year of additional time for training and pruning. However, this amount of additional time is small relative to harvest labor, which required about 500 hours per acre per year.
- Trends in yield were complex, but trellised currants tended to outyield untrellised currants, perhaps because of overly heavy pruning in untrellised currant plots.
- Trellised plants ripened fruit more uniformly.
- Harvest speed (in pints per hours) was somewhat faster for trellised plants.
- Over the long term, weed control and pulling back landscape fabric to apply soil amendments would likely be easier in trellised plantings.
- Workers preferred working in trellised plantings, particularly for thorny gooseberry varieties.
- Periodic dieback of canes reduces the profitability of trellised plantings.
- Varieties differ greatly in their suitability for cordon trellising. Among currants, Pink Champagne performed poorly when trellised because it rarely produced branches from the cordon. Among gooseberries, Tixia and Hinnomaki Red performed poorly because they were small plants which did not utilize trellis space and yielded poorly when trellised.

Is the cordon-trellising method worthwhile? We recommend it with reservations, subject to further study. Some important considerations:

- The cordon trellis has high establishment costs (in terms of both materials and labor), analogous to high-density apple production. Therefore it seems most appropriate when markets are assured, fruit prices are high, and other aspects of the production system (such as soil fertility, pest control, and post-harvest handling) are well-managed. High establishment costs only make financial sense when the entire production and marketing system is consistently well-optimized to produce a rapid return on investment.
- Longer-term trials would reveal more about the benefits and drawbacks of cordon trellising.
- There are likely substantial gains to be realized in refining pruning and training techniques for specific varieties and developing specific rules for ideal number of branches per foot of cordon, ideal branch length, etc.
- Cordon trellising is probably best suited to farmers who understand and enjoy the horticultural intricacies of plant training and who will invest the time in honing their techniques.
- Choose varieties which are well suited to the trellising technique.

Appendix. Data Tables

Yields (Half-pints per acre)

Currants			
2021	**No Harvest**		
2022	**Trellised**	**Untrellised**	**Average**
Blanka	30826	14966	22896
Jonkheer van Tets	31342	8207	19774
Pink Champagne	20488	9248	14868
Rovada	10977	3982	7480
Average of all varieties	**23408**	**9101**	**16255**
2023	**Trellised**	**Untrellised**	**Average**
Blanka	64748	31646	46692
Jonkheer van Tets	28955	17606	23280
Pink Champagne	11471	12378	11925
Rovada	31959	8088	20023
Average of all varieties	**32959**	**17429**	**25029**
Gooseberries			
2021	**Trellised**	**Untrellised**	**Average**
Black Velvet	0	0	0
Captivator	4328	8916	6622
Hinnomaki Red	0	0	0
Tixia	0	0	0
Average of all varieties	**1082**	**2229**	**1656**
2022	**Trellised**	**Untrellised**	**Average**
Black Velvet	2639	1388	2014
Captivator	27925	22226	25076
Hinnomaki Red	5842	10922	8382
Tixia	0	0	0
Average of all varieties	**9101**	**8634**	**8868**
2023	**Trellised**	**Untrellised**	**Average**
Black Velvet	0	0	0
Captivator	11362	1670	6516
Hinnomaki Red	5082	11607	8344
Tixia	0	0	0
Average of all varieties	**4111**	**3319**	**3715**

Harvest speed (Half-pints per hour)

Currants			
2022	**Trellised**	**Untrellised**	**Overall**
Blanka	49.1	39.0	45.3
Jonkheer van Tets	36.3	32.2	35.4
Pink Champagne	11.9	12.4	12.0
Rovada	33.0	29.0	31.8
All varieties	**26.4**	**23.9**	**25.6**
2023	**Trellised**	**Untrellised**	**Overall**
Blanka	107.6	68.0	88.5
Jonkheer van Tets	43.6	30.2	37.4
Pink Champagne	19.1	18.9	19.0
Rovada	65.0	49.0	61.0
All varieties	**56.0**	**37.3**	**47.5**
Gooseberries			
2021	**Trellised**	**Untrellised**	**Overall**
Captivator	14.4	12.1	12.8
2022	**Trellised**	**Untrellised**	**Overall**
Black Velvet	17.7	9.5	13.6
Captivator	42.6	48.5	45.0
Hinnomaki Red	24.6	19.5	21.0
All varieties	**28.3**	**26.4**	**27.6**
2023	**Trellised**	**Untrellised**	**Overall**
Captivator	82.5	19.4	58.2
Hinnomaki Red	21.7	37.9	30.9
All varieties	**47.7**	**31.7**	**40.2**

Materials Costs Per Acre

	Currants Untrellised	Currants Trellised	Gooseberries Untrellised	Gooseberries Trellised
Landscape fabric	$1,245	$1,245	$1,245	$1,245
Irrigation	$353	$353	$353	$353
Plants	$7,665	$15,331	$9,114	$18,229
Trellis	$0	$9,010	$0	$6,085

Labor Hours Per Acre, 2019-2020

Crop	Variety	Trellising Treatment	Deer Fencing	Field Preparation	Irrigation Setup	Mulch	Other	Weed	Planting	Harvest	Training and Pruning	Trellis Construction	Total
Currant	Blanka	T	32.8	25.6	31.3	31.3	18.2	39.4	44.2	0.0	31.3	126.6	380.6
Currant	Blanka	UT	32.8	25.6	31.3	31.3	18.2	39.4	22.1	0.0	1.7	0.0	202.3
Currant	Jonkheer van Tets	T	32.8	25.6	31.3	31.3	18.2	39.4	44.2	0.0	35.4	126.6	384.8
Currant	Jonkheer van Tets	UT	32.8	25.6	31.3	31.3	18.2	39.4	22.1	0.0	2.4	0.0	203.1
Currant	Pink Champagne	T	32.8	25.6	31.3	31.3	18.2	39.4	44.2	0.0	66.7	126.6	416.1
Currant	Pink Champagne	UT	32.8	25.6	31.3	31.3	18.2	39.4	22.1	0.0	4.5	0.0	205.2
Currant	Rovada	T	32.8	25.6	31.3	31.3	18.2	39.4	44.2	0.0	18.7	126.6	368.1
Currant	Rovada	UT	32.8	25.6	31.3	31.3	18.2	39.4	22.1	0.0	0.0	0.0	200.6
Gooseberry	Black Velvet	T	32.8	25.6	31.3	31.3	18.2	39.4	161.1	0.0	76.9	126.6	543.1
Gooseberry	Black Velvet	UT	32.8	25.6	31.3	31.3	18.2	39.4	80.5	0.0	3.2	0.0	262.3
Gooseberry	Captivator	T	32.8	25.6	31.3	31.3	18.2	39.4	161.1	0.0	89.8	126.6	556.1
Gooseberry	Captivator	UT	32.8	25.6	31.3	31.3	18.2	39.4	80.5	0.0	9.1	0.0	268.1
Gooseberry	Hinnomaki Red	T	32.8	25.6	31.3	31.3	18.2	39.4	44.2	0.0	34.4	126.6	383.8
Gooseberry	Hinnomaki Red	UT	32.8	25.6	31.3	31.3	18.2	39.4	22.1	0.0	0.0	0.0	200.6
Gooseberry	Tixia	T	32.8	25.6	31.3	31.3	18.2	39.4	44.2	0.0	26.7	126.6	376.1
Gooseberry	Tixia	UT	32.8	25.6	31.3	31.3	18.2	39.4	22.1	0.0	0.0	0.0	200.6

Labor Hours Per Acre, 2021

Crop	Variety	Trellising Treatment	Deer Fencing	Field Preparation	Irrigation Setup	Mulch	Other	Weed	Planting	Harvest	Training and Pruning	Trellis Construction	Total
Currant	Blanka	T	1.8	0.0	0.0	0.0	29.4	61.2	0.0	0.0	94.6	0.0	187.1
Currant	Blanka	UT	1.8	0.0	0.0	0.0	29.4	43.4	0.0	0.0	0.0	0.0	74.7
Currant	Jonkheer van Tets	T	1.8	0.0	0.0	0.0	29.4	44.4	0.0	0.0	98.2	0.0	173.8
Currant	Jonkheer van Tets	UT	1.8	0.0	0.0	0.0	29.4	49.2	0.0	0.0	0.0	0.0	80.5
Currant	Pink Champagne	T	1.8	0.0	0.0	0.0	29.4	47.9	0.0	0.0	117.0	0.0	196.2
Currant	Pink Champagne	UT	1.8	0.0	0.0	0.0	29.4	50.6	0.0	0.0	0.0	0.0	81.9
Currant	Rovada	T	1.8	0.0	0.0	0.0	29.4	47.9	0.0	0.0	107.1	0.0	186.3
Currant	Rovada	UT	1.8	0.0	0.0	0.0	29.4	49.5	0.0	0.0	0.0	0.0	80.8
Gooseberry	Black Velvet	T	1.8	0.0	0.0	0.0	29.4	52.2	0.0	0.0	59.3	0.0	142.7
Gooseberry	Black Velvet	UT	1.8	0.0	0.0	0.0	29.4	81.8	0.0	0.0	0.0	0.0	113.1
Gooseberry	Captivator	T	1.8	0.0	0.0	0.0	29.4	50.5	0.0	306.2	87.8	0.0	475.8
Gooseberry	Captivator	UT	1.8	0.0	0.0	0.0	29.4	59.1	0.0	732.3	0.0	0.0	822.7
Gooseberry	Hinnomaki Red	T	1.8	0.0	0.0	0.0	29.4	77.8	0.0	0.0	73.9	0.0	183.0
Gooseberry	Hinnomaki Red	UT	1.8	0.0	0.0	0.0	29.4	50.7	0.0	0.0	0.0	0.0	82.0
Gooseberry	Tixia	T	1.8	0.0	0.0	0.0	29.4	47.8	0.0	0.0	72.1	0.0	151.1
Gooseberry	Tixia	UT	1.8	0.0	0.0	0.0	29.4	69.9	0.0	0.0	0.0	0.0	101.1

Labor Hours Per Acre, 2022

Crop	Variety	Trellising Treatment	Deer Fencing	Field Preparation	Irrigation Setup	Mulch	Other	Weed	Planting	Harvest	Training and Pruning	Trellis Construction	Total
Currant	Blanka	T	0.0	0.0	0.0	0.0	14.2	32.4	0.0	627.4	104.9	0.0	778.9
Currant	Blanka	UT	0.0	0.0	0.0	0.0	14.2	24.6	0.0	383.6	11.0	0.0	433.4
Currant	Jonkheer van Tets	T	0.0	0.0	0.0	0.0	14.2	21.2	0.0	863.5	139.5	0.0	1038.5
Currant	Jonkheer van Tets	UT	0.0	0.0	0.0	0.0	14.2	26.4	0.0	254.6	18.1	0.0	313.3
Currant	Pink Champagne	T	0.0	0.0	0.0	0.0	14.2	25.1	0.0	1728.3	143.3	0.0	1910.8
Currant	Pink Champagne	UT	0.0	0.0	0.0	0.0	14.2	34.0	0.0	745.5	26.1	0.0	819.8
Currant	Rovada	T	0.0	0.0	0.0	0.0	14.2	25.3	0.0	332.9	87.8	0.0	460.2
Currant	Rovada	UT	0.0	0.0	0.0	0.0	14.2	25.0	0.0	137.2	8.6	0.0	185.0
Gooseberry	Black Velvet	T	0.0	0.0	0.0	0.0	14.2	51.1	0.0	148.7	79.2	0.0	293.2
Gooseberry	Black Velvet	UT	0.0	0.0	0.0	0.0	14.2	46.8	0.0	146.9	44.6	0.0	252.5
Gooseberry	Captivator	T	0.0	0.0	0.0	0.0	14.2	39.6	0.0	655.1	100.9	0.0	809.8
Gooseberry	Captivator	UT	0.0	0.0	0.0	0.0	14.2	43.0	0.0	458.3	61.1	0.0	576.5
Gooseberry	Hinnomaki Red	T	0.0	0.0	0.0	0.0	14.2	50.7	0.0	237.7	71.9	0.0	374.6
Gooseberry	Hinnomaki Red	UT	0.0	0.0	0.0	0.0	14.2	47.4	0.0	559.1	48.0	0.0	668.7
Gooseberry	Tixia	T	0.0	0.0	0.0	0.0	14.2	46.3	0.0	0.0	66.6	0.0	127.0
Gooseberry	Tixia	UT	0.0	0.0	0.0	0.0	14.2	53.8	0.0	0.0	22.6	0.0	90.7

Labor Hours Per Acre, 2023

Crop	Variety	Trellising Treatment	Deer Fencing	Field Preparation	Irrigation Setup	Mulch	Other	Weed	Planting	Harvest	Training and Pruning	Trellis Construction	Total
Currant	Blanka	T	0.1	0.0	0.2	0.2	0.8	15.1	0.0	471.9	88.7	0.0	577.0
Currant	Blanka	UT	0.1	0.0	0.2	0.2	0.8	11.0	0.0	348.5	22.0	0.0	382.8
Currant	Jonkheer van Tets	T	0.1	0.0	0.2	0.2	0.8	17.5	0.0	892.6	119.9	0.0	1031.4
Currant	Jonkheer van Tets	UT	0.1	0.0	0.2	0.2	0.8	11.3	0.0	680.4	28.6	0.0	721.7
Currant	Pink Champagne	T	0.1	0.0	0.2	0.2	0.8	27.5	0.0	660.1	87.2	0.0	776.1
Currant	Pink Champagne	UT	0.1	0.0	0.2	0.2	0.8	16.7	0.0	629.2	31.0	0.0	678.2
Currant	Rovada	T	0.1	0.0	0.2	0.2	0.8	19.7	0.0	376.4	86.4	0.0	483.9
Currant	Rovada	UT	0.1	0.0	0.2	0.2	0.8	12.7	0.0	188.7	23.6	0.0	226.3
Gooseberry	Black Velvet	T	0.1	0.0	0.2	0.2	0.8	58.5	0.0	0.0	76.0	0.0	135.8
Gooseberry	Black Velvet	UT	0.1	0.0	0.2	0.2	0.8	45.8	0.0	0.0	53.3	0.0	100.4
Gooseberry	Captivator	T	0.1	0.0	0.2	0.2	0.8	68.3	0.0	559.1	93.9	0.0	722.5
Gooseberry	Captivator	UT	0.1	0.0	0.2	0.2	0.8	47.4	0.0	183.7	64.7	0.0	297.1
Gooseberry	Hinnomaki Red	T	0.1	0.0	0.2	0.2	0.8	39.0	0.0	199.3	100.1	0.0	339.7
Gooseberry	Hinnomaki Red	UT	0.1	0.0	0.2	0.2	0.8	41.4	0.0	470.9	60.2	0.0	573.8
Gooseberry	Tixia	T	0.1	0.0	0.2	0.2	0.8	61.8	0.0	0.0	64.9	0.0	128.0
Gooseberry	Tixia	UT	0.1	0.0	0.2	0.2	0.8	48.0	0.0	0.0	41.8	0.0	91.1

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