

**Okanagan Valley
Tree Fruit Authority**

Replanting for the Future

YIELD AND PRICE SURVEY

Final Report

June 1999



Ministry of
Agriculture and Food

Okanagan Valley
Tree Fruit Authority

Executive Summary

To support the assessment of the Okanagan Valley Tree Fruit Authority Replant Program, the OVTFA Board approved funding for a yield and price survey of apple, cherry and peach replant projects.

Survey respondents were selected from replant projects planted between 1992 and 1995. Data was collected from 356 replant blocks. Even though this study is a survey and not a replicated trial, the data is considered reasonably accurate. Most growers had good records for their replant blocks and knowledgeable and experienced interviewers collected the information.

Observations

The general observations from this survey are:

- There is wide variability in yields and gross revenues for all density ranges. \$2,115 per acre average gross revenue in the fifth leaf for the bottom one third of the blocks and \$13,164 per acre for the top one third average indicate the wide variability in performance.
- Replanting to new varieties for most replant projects has been successful when compared to maintaining existing blocks of Red Delicious or other traditional varieties.
- The success of replanting is highly dependent on planting very marketable varieties (i.e. obtaining higher prices).
- Overall, highest gross revenues per acre for apples were reported with planting densities between 1,200 - 2,000 trees per acre.
- Higher density plantings produced earlier yields and higher gross revenues than lower density blocks.
- There is a high risk associated with replanting. Excellent horticultural skills combined with the choice of a variety or commodity that will return sufficient revenue to repay the establishment costs in a reasonable timeframe are required.

Conclusions

Considering the results of the survey, replanting to new higher value varieties and commodities can work. However, the results show a high degree of variability in production and revenue. To reduce that variability and ensure broad success across the industry, an integrated, multi-stakeholder approach to replanting is required, involving producers, industry, agri-business and governments.

To encourage replanting of orchards to improve overall profitability, the following issues should be addressed:

- **Continued financial assistance for replant projects.** The wide variability in performance and the risk associated with planting new varieties requires an incentive to encourage growers to replant on an accelerated basis.
- **Enhanced horticultural management and education assistance to ensure success in high density management.** The survey identifies that some growers do extremely well while other growers are not as successful. Steps should be taken to assist growers and their advisors to improve their replant knowledge. Improved grower skills will help increase the success of replant projects.
- **Continued support for tree fruit research.** On going research is critical to solving the technical problems that always occur in the tree fruit industry.
- **A market development strategy including assessment of new varieties and commodities.** Since the replanting program is so dependent on planting high value varieties, the industry should develop an overall industry plan for assessing new variety introduction and pass that information to growers. Growers can make informed decisions based on that information. Implications of fruit quality and marketing must be considered as well.

Background

In 1990 the Okanagan Valley Tree Fruit Authority was established to assist with the revitalization of the tree fruit industry. A major thrust of the OVTFA was a replant program based on assisting the replanting of older plantings with new high density plantings of new higher value varieties. From 1991 to 2000 interior growers have been eligible for grants for replanting.

In December 1998, the OVTFA Board approved funding for a replant yield and quality survey for projects funded under the replant program from 1992 to 1995. The BC Ministry of Agriculture and Food Tree Fruit and Grape Commodity Team was assigned to implement the survey and develop an analysis of the data. Funds were approved and the survey team decided that the money was best spent in the interview part of the survey. Our first step was a meeting with the Okanagan Fieldmen's Group to discuss the parameters of the study and potential contractors. Some of the packinghouses wanted to survey their own growers and we subsequently contracted with BC Fruit Packers, Westbank Packers and Okanagan North Cooperative for their growers. Okanagan Similkameen Coop, Sun Fresh Cooperative. All Creston growers and independent growers were interviewed by other contractors.

The reasons for the survey

Since very limited BC data was available prior to the survey, and since the replant program was scheduled to finish in 2000, a proposal for the survey was developed. It was recognized that there is a wide variation of success in the replant program and an attempt at identifying the critical management steps might help those growers who are having difficulty with their replant projects

Parameters of study

Grower Sample

185 growers were selected out of the total list of replant clients (approximately 450) who received funding under the Replant program between 1992 and 1995. The varieties selected were Gala, Fuji, Jonagold apples; Lapins and Sweetheart cherries and several peach varieties. Our main goal was to obtain a reasonably large sample of blocks in any one variety or commodity. The 1995 list was only selected from apple densities that exceeded 1500 trees per acre.

About 125 growers that comprised of 356 blocks had reliable enough data that could be used. The sample was not truly randomized because not all growers have useable records. In spite of this, we did receive data from a wide range of growers - from the less than average to the very best. Where the data was incomplete or apparently inconsistent, the information was not used.

Areas Surveyed

	Number of Blocks	Acreage
Vernon, Lake Country, Salmon Arm	62	92
Kelowna area	79	89
Penticton, Summerland, Naramata, OK Falls	72	47
Oliver - Osoyoos areas	77	74
Similkameen	46	39
Creston Valley	20	71
Totals	356	412

Sample Size

Commodity	Number of Blocks	Acreage
Gala	139	159
Fuji	112	119
Jonagold	34	31
Cherry	25	79
Peach	46	24
Totals	356	412

Cumulative Yield by Density of the Apple Blocks Surveyed

Density	# of Blocks	Cumulative Yield to 6th Leaf
<800	120	50,000
800-1200	80	64,600
1200-1500	20	104,500
1500-2000	16	129,000
>2000	44	135,500
Total	280	

Replant Survey Team

Jim Campbell acted as coordinator, George Geldart provided economic input, Ken McAra provided data base and graphing expertise, Helmut Arndt provided horticultural expertise and Lynn Simon provided administrative skills to the committee.

Interviewer contractors

A number of experienced Horticulturists were contracted to do the survey. Stan Swales, Henry Markgraf, Bob Fisher-Fleming, David Mitchell, Jack Barkwill, Gavin Young, Gordon Taylor, Tim Watson, and Mike Sanders were the interviewers. All of the interviews took place at the growers orchards utilizing closing pool statements for the varieties selected.

Analysis of Replant Program Survey Results

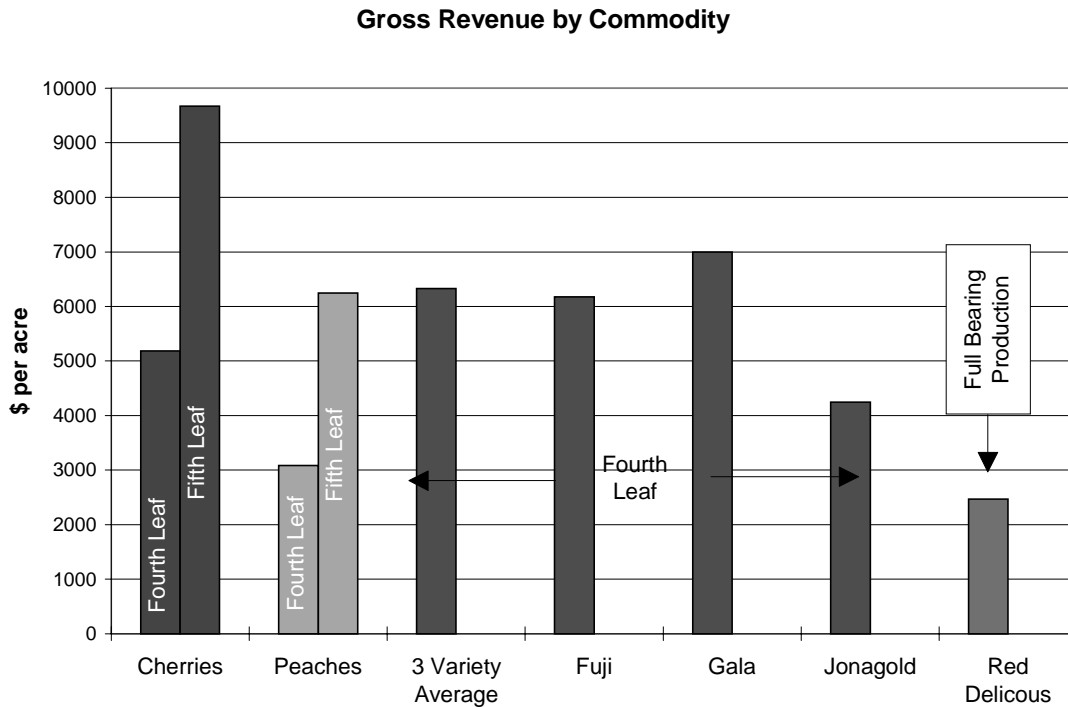
Overview

This section compares gross revenues from existing plantings with those from replanted blocks for apples, cherries, and peaches. Gross revenue equals production times price. **Red Delicious has been used as the benchmark variety for comparison purposes only, by using industry wide average estimates for production and price.**

Yield and price data has been collected for the years 1993-1998 from replant projects planted in 1992, 1993, 1994 and 1995. For the purposes of this report, the data has been analyzed from the perspective of 2nd to the 7th leaf rather from a calendar year basis.

To obtain a comprehensive analysis of replanting, we need to examine the establishment cost of replanting to assess its economic impact. As this survey only examines the yield and revenue side of replant, readers must be aware of the initial capital cost as well as the risk of variety selection, weather and the overall future market demand of apple and soft fruit prices. (see conclusions)

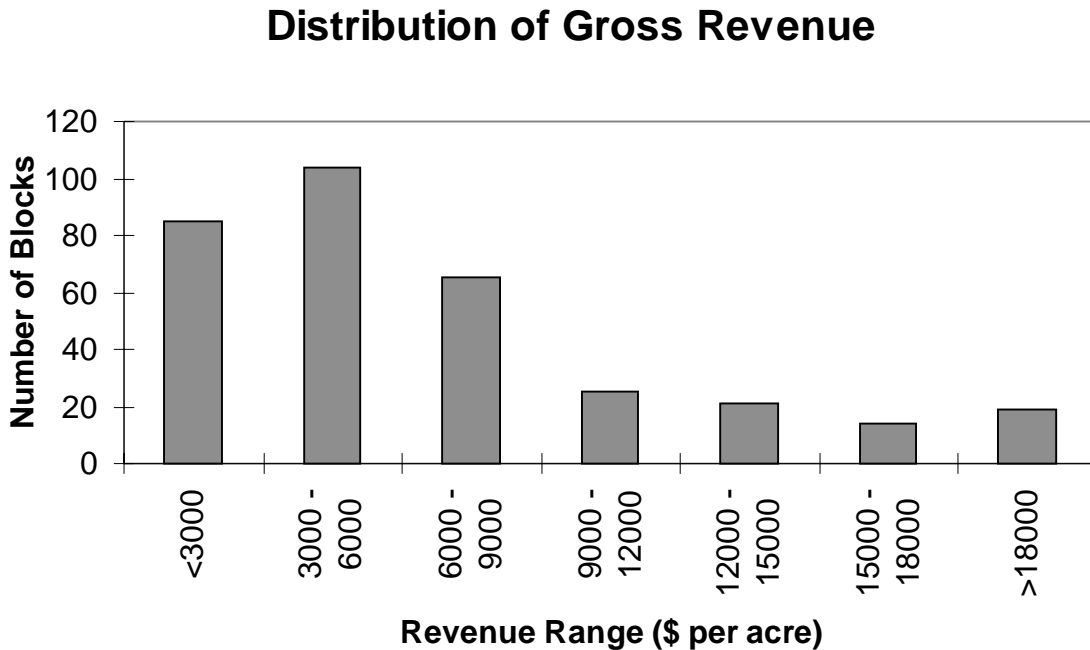
GRAPH 1: Gross Revenue by Commodity



Graph 1 compares gross revenues from new plantings with established Red Delicious trees. For apples, the average gross revenue was calculated for the fourth leaf stage, assuming this approximates full bearing production at least for the higher density plantings. For cherries and peaches, the fourth and fifth leaf have been included because significant production is not attained until at least the fifth leaf on the soft fruits. Red Delicious represents average production and average returns derived from industry wide data.

The comparison illustrates the potential of replanting versus keeping existing plantings and is one measure of the success of projects funded under the replant program. These results indicate that the average gross returns for all varieties selected exceeded the benchmark value.

GRAPH 2: Distribution of Gross Revenue (Fifth Leaf) - Apples and Soft Fruits



Graph 2 shows the distribution of gross revenue to growers in the fifth leaf stage. It is clear that there was a wide range of incomes by this stage, indicating the risk associated with replanting.

The mean (average) gross revenue in the fifth leaf was \$6789 per acre but the standard deviation was \$5658, indicating a wide variance in returns in the fifth leaf.

A significant number of projects lagged behind the average. The bottom third had an average gross revenue of \$2055 per acre by the fifth leaf.

These data point out the high degree of variation and the associated risk. Such variation could be caused by a number of factors including different horticultural skill levels, less than ideal sites, market variability, and commodity and variety choice.

TABLE 1: Average Price Per Pound by Year

	1993	1994	1995	1996	1997	1998
— cents per pound —						
Gala	52.9	54.7	65.4	53.1	34.1	32.5
Fuji	56.1	54.0	58.4	47.2	23.7	25.9
Jonagold	38.2	18.7	28.1	29.7	17.3	17.6
3 Varieties	50.5	48.2	57.6	47.9	27.9	28.0
Peaches	n/a	45.0	49.4	49.2	47.4	59.2
— \$ per pound —						
Cherries	n/a	1.75	1.70	1.73	1.81	1.60

GRAPH 3: Average Price Per Pound by Year

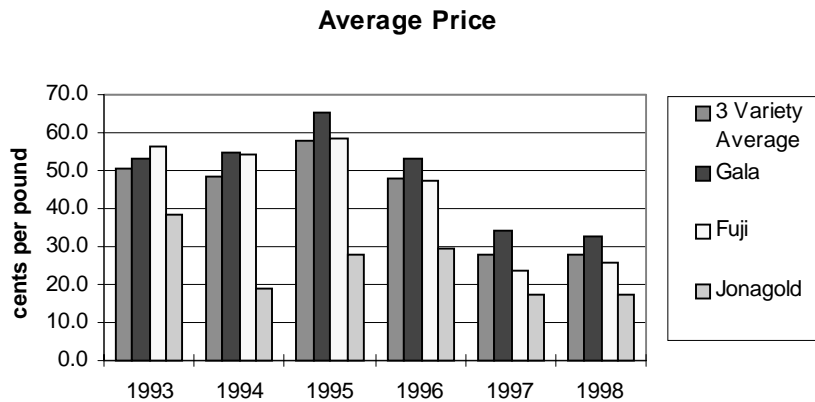
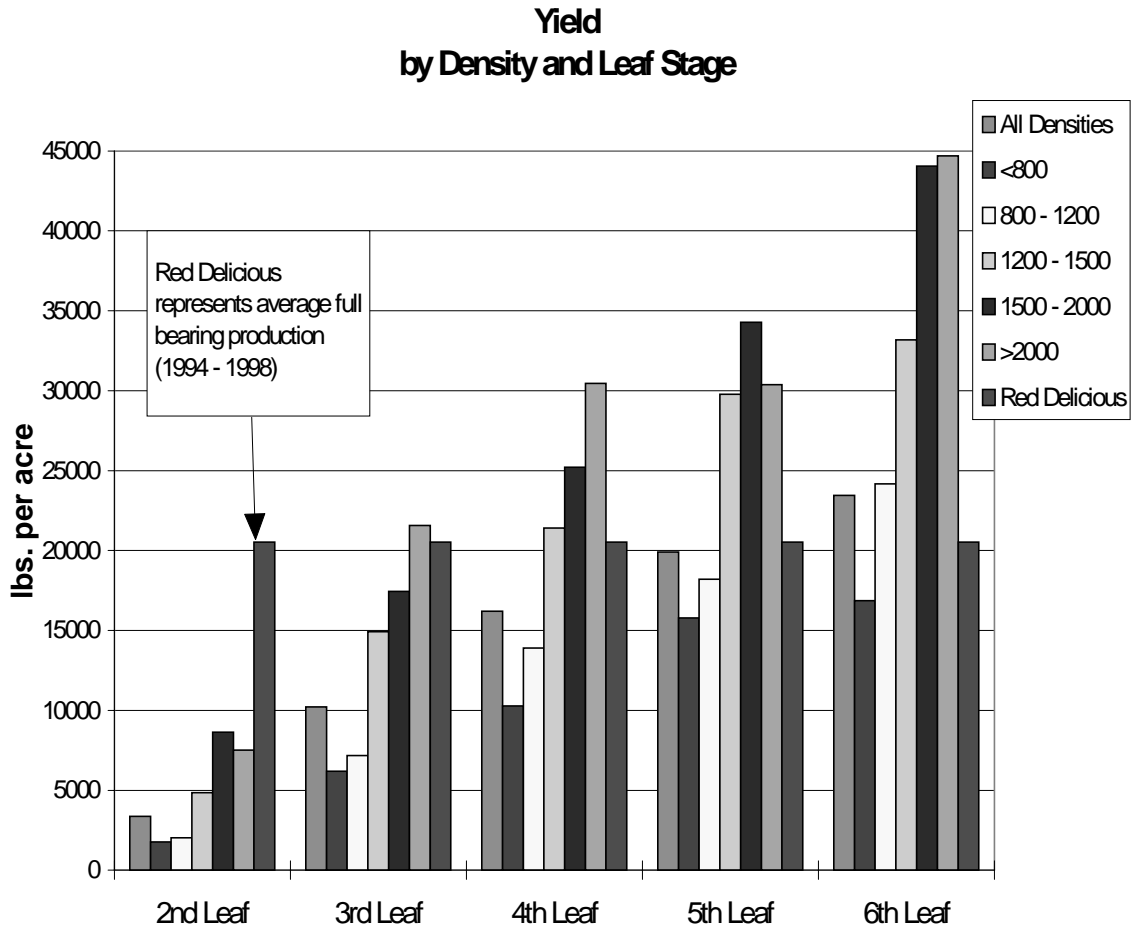


Table 1 and Graph 3 show the average prices reported on the survey by year. There has been a general trend over the last few years of declining prices for all varieties as a result of increasing global production for those varieties. From 1995 to 1998 the average price for all apples dropped 51%. Fuji suffered the greatest decline dropping 56% from the 1995 high of 58.4 dropping to a low of 25.9 (prelim.) in 1998.

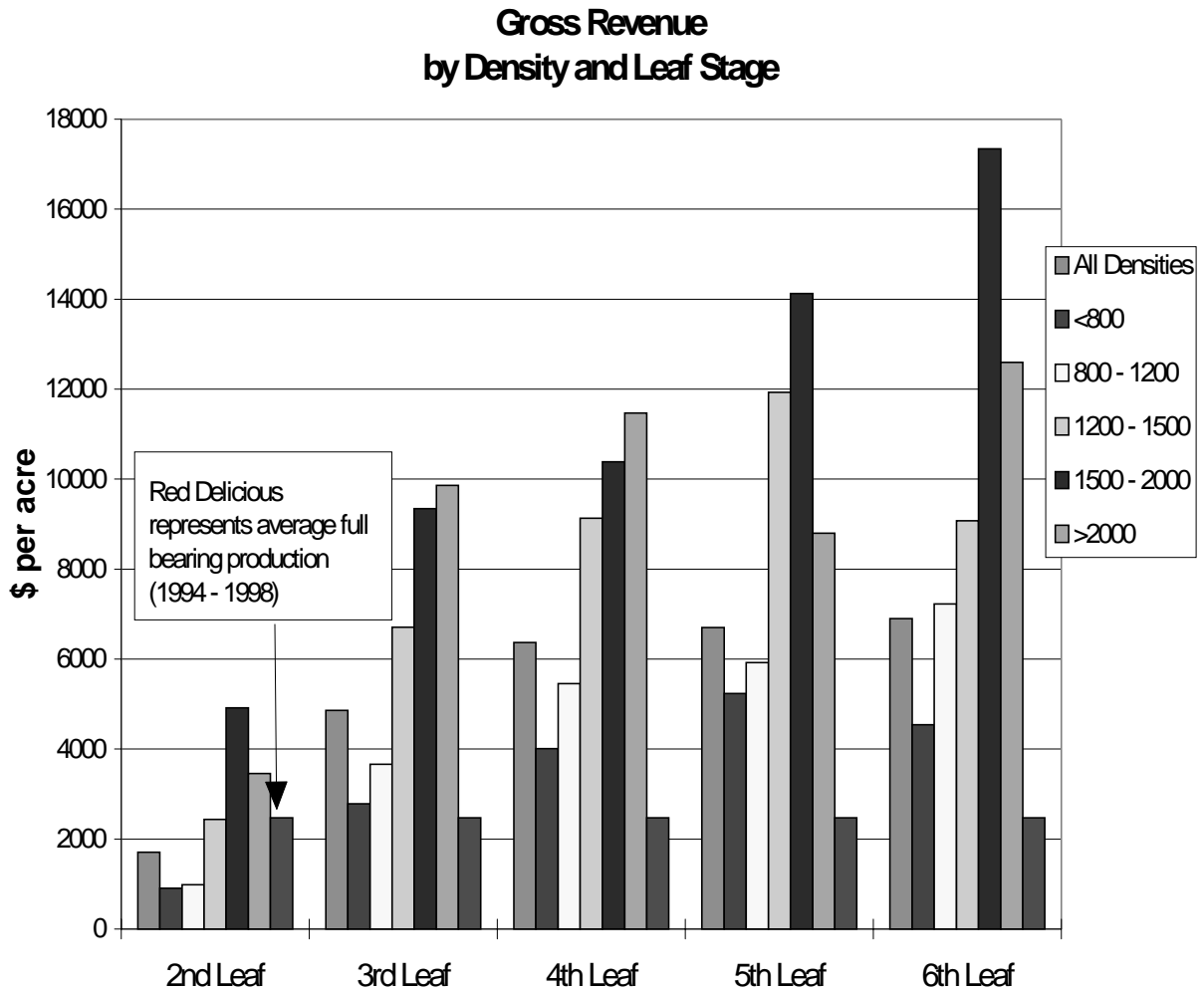
Apples

GRAPH 4: Yield by Density - Gala, Fuji and Jonagold Combined



Graph 4 indicates the average yield for all selected apple varieties by leaf stage and density. Yield generally increased with density. At densities greater than 1200, yields met or exceeded the estimated yield from full bearing Red Delicious apples by the fourth leaf stage. High densities (greater than 1500 trees per acre) continued to experience annual yield increases up to the sixth leaf. However, it is expected that yields would level off at this point. Due to the time period over which this survey was conducted, we have no data to confirm this. Users are cautioned not to extrapolate this data beyond this point.

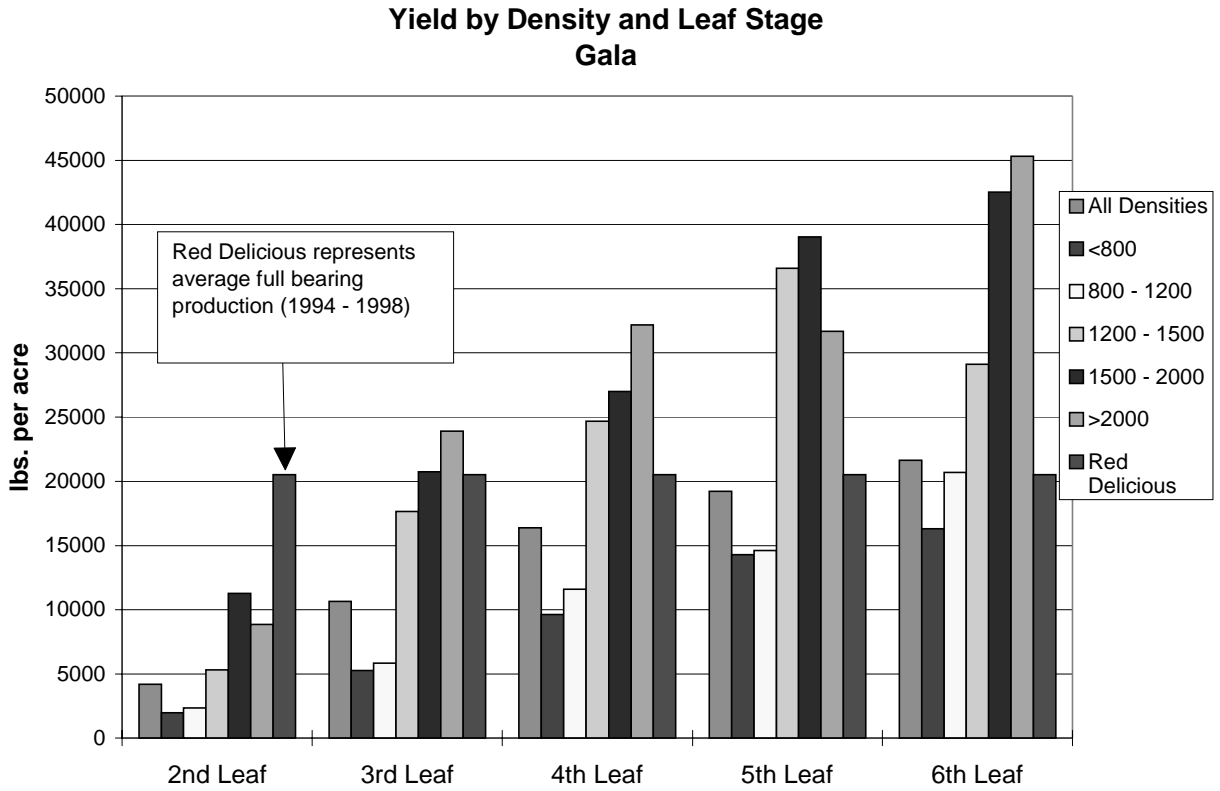
GRAPH 5: Gross Revenue by Density - Gala, Fuji and Jonagold Combined



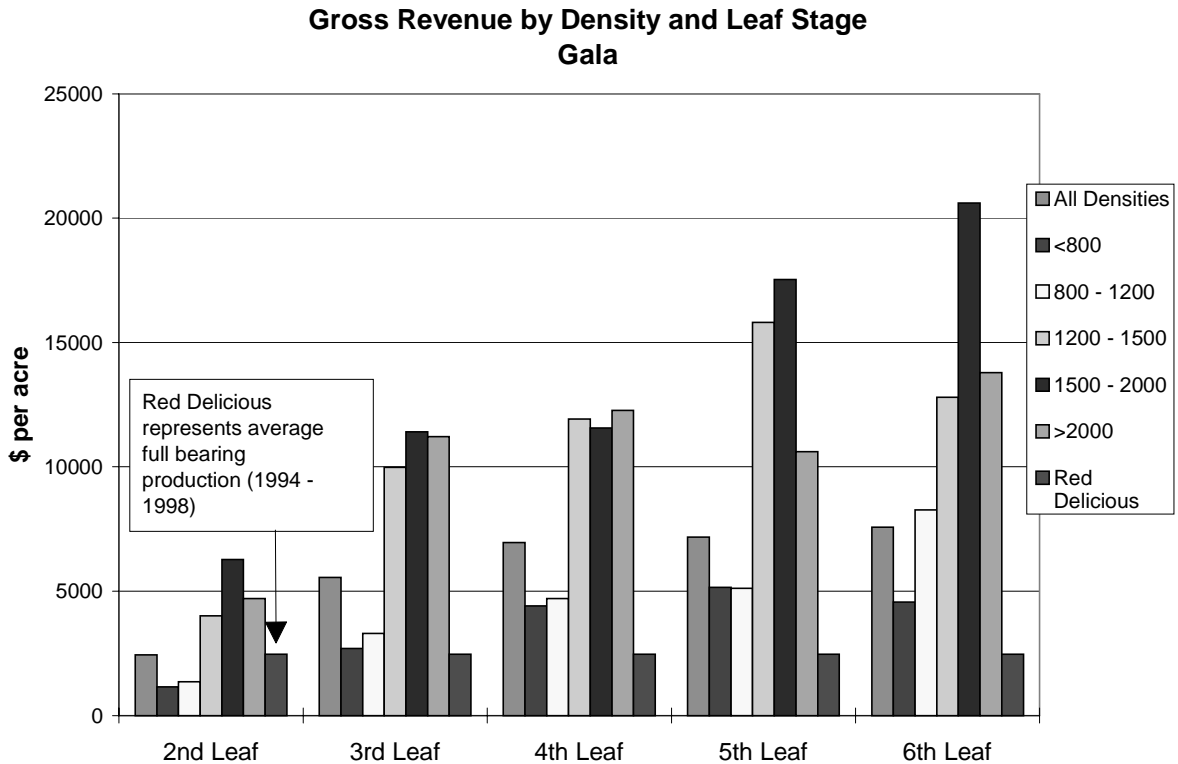
Graph 5 shows the average gross returns for all selected apple varieties by leaf stage and density. Gross revenue generally increased with density. At densities greater than 1200, gross revenues met or exceeded the estimated gross revenues from full bearing Red Delicious apples by the second leaf stage. By the fourth and fifth leaf, very high densities (greater than 2000 trees per acre) produced a lower gross revenue than trees planted at 1500 - 2000.

Gala

GRAPH 6: Yield by Density - Gala



GRAPH 7: Gross Revenue by Density - Gala



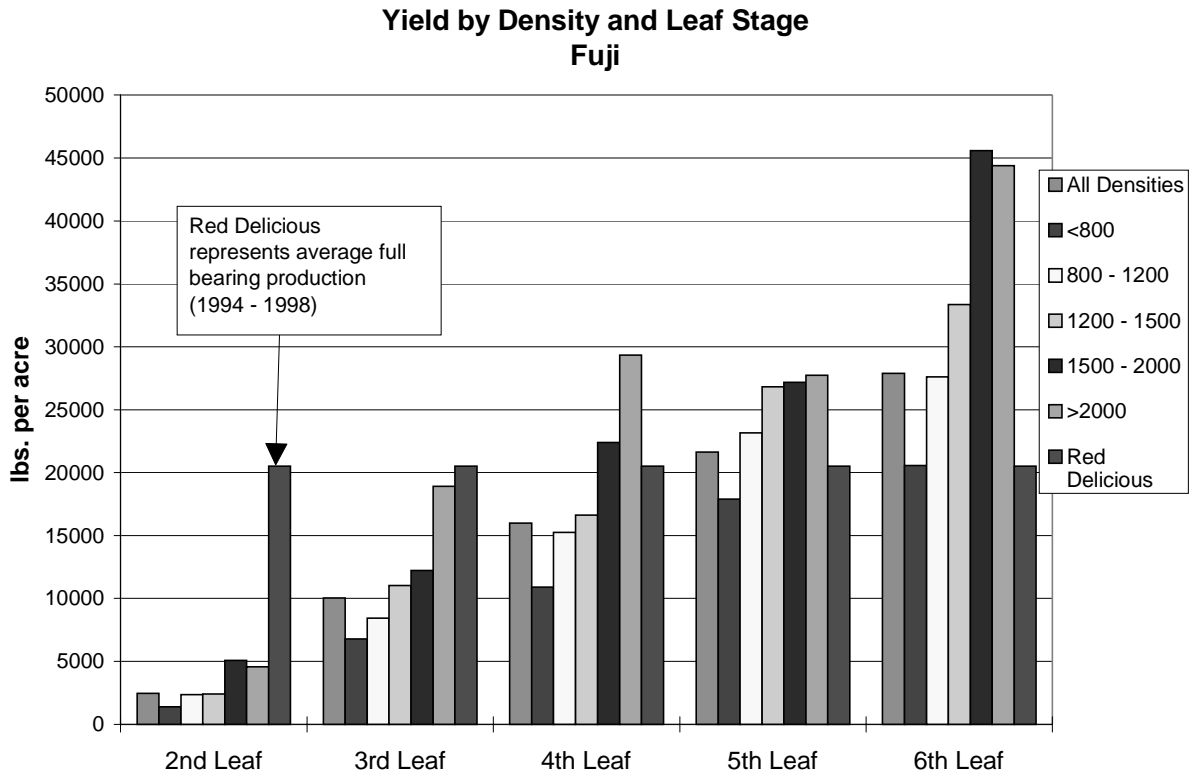
Gala was the most common variety replanted in the survey. Graphs 6 and 7 show the impact of density on yield and gross revenue, respectively.

Generally there was a distinct improvement in yield above 1200 trees per acre. Yields exceeded the full bearing Red Delicious benchmark by the third leaf for densities above 1500 trees per acre.

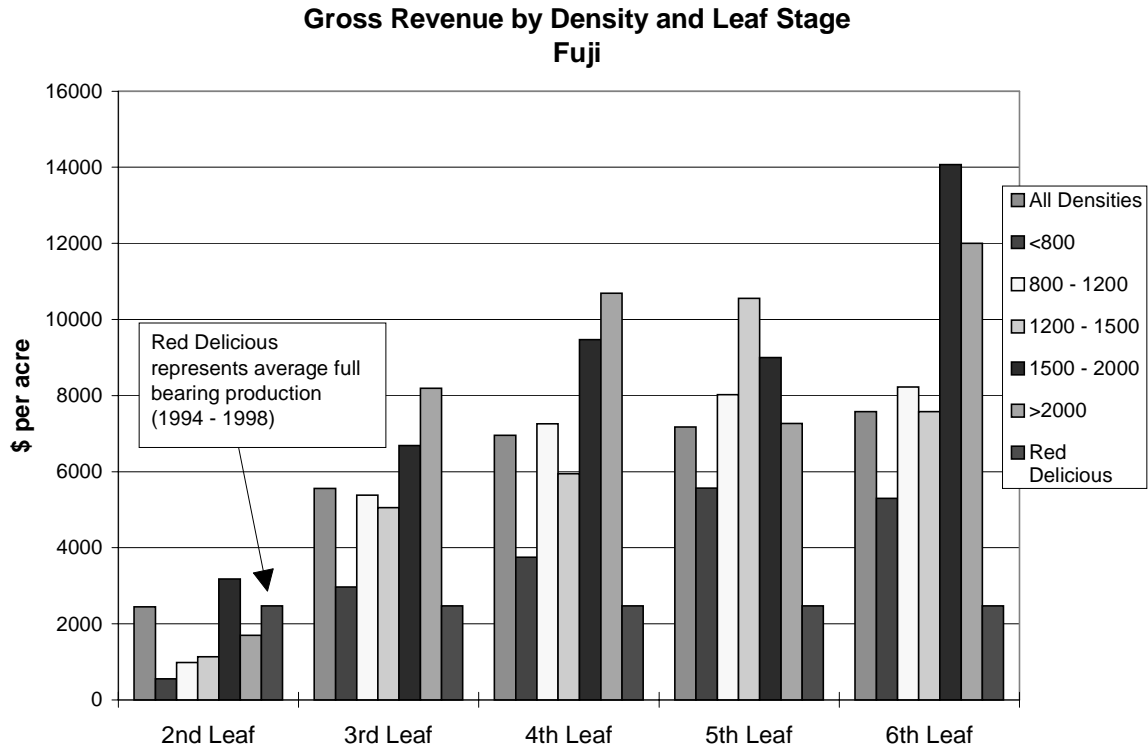
Higher density plantings of Gala returned almost double the revenue from Red Delicious in the second leaf stage. This was due primarily to the much higher prices received for Gala than Red Delicious. The highest gross revenues were observed when densities were between 1500 and 2000 trees per acre. Even though the yields were similar or higher for densities greater than 2000 trees per acre, gross revenues from the 1500 to 2000 trees per acre category were higher.

Fuji

GRAPH 8: Yield by Density - Fuji



GRAPH 9: Gross Revenue by Density - Fuji



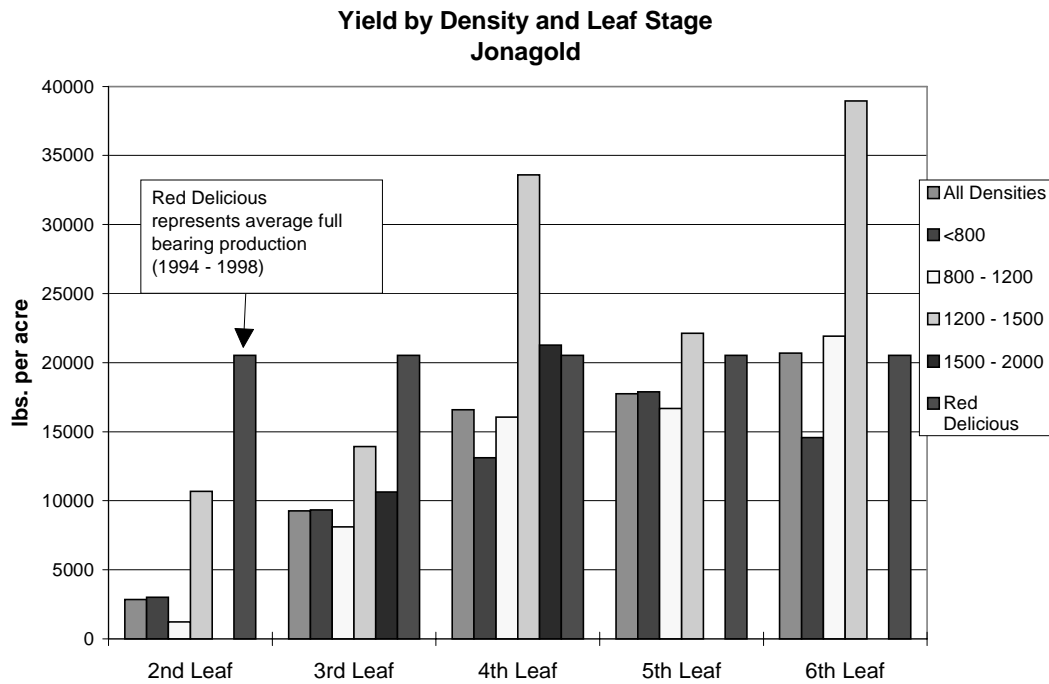
Fuji was the second most common variety replanted in the survey. Graphs 8 and 9 show the impact of density on yield and gross revenue, respectively.

Generally there was a distinct improvement in yield for Fuji above 1200 trees per acre. Yields for Fuji were highest in the 1500 - 2000 trees per acre category by the sixth leaf.

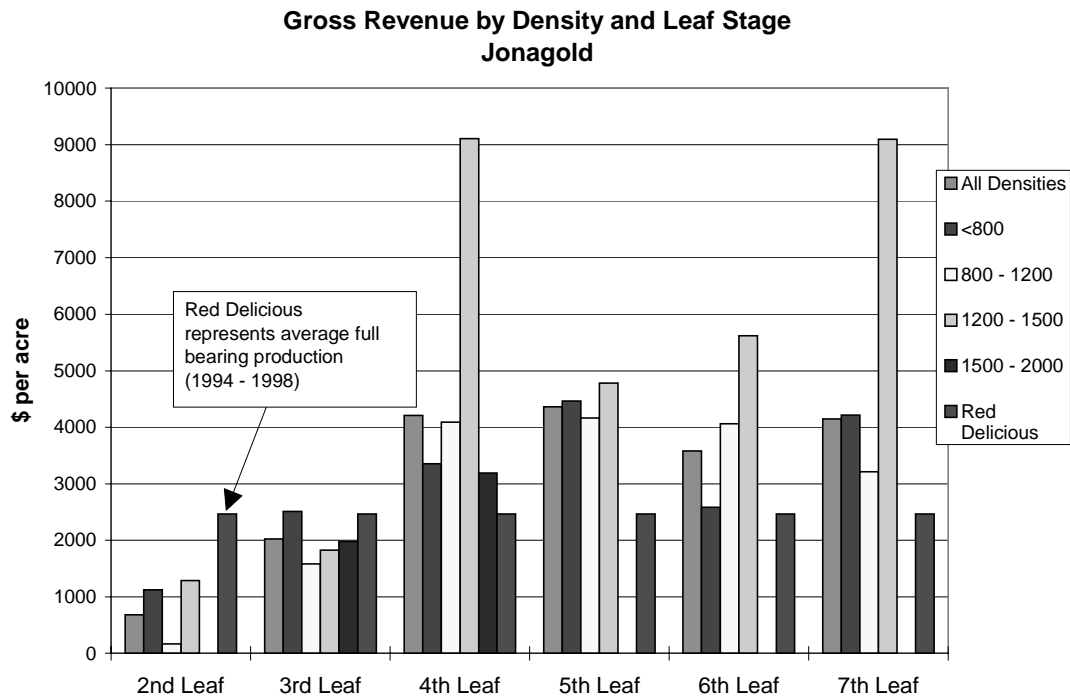
Higher density plantings of Fuji exceeded the revenue from Red Delicious in the second leaf stage. This was due primarily to the much higher prices received for Fuji than Red Delicious. By the sixth leaf, the highest gross revenues were observed when densities were between 1500 and 2000 trees per acre.

Jonagold

GRAPH 10: Yield by Density - Jonagold



GRAPH 11: Gross Revenue by Density - Jonagold



Jonagold was the least frequently surveyed variety. Graphs 10 and 11 show the impact of density on yield and gross revenue, respectively.

Jonagold did not yield as well as Gala or Fuji. Yields did not exceed the benchmark Red Delicious until the third leaf and only in the higher densities. No data were available for densities greater than 1500 trees per acre beyond the fourth leaf.

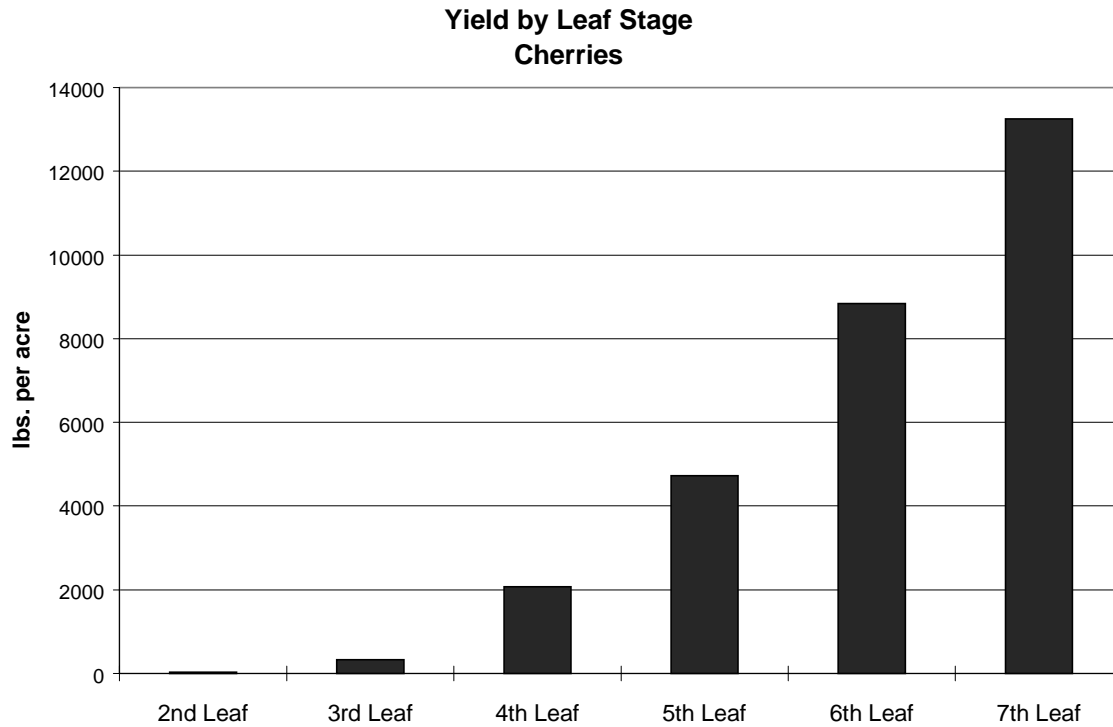
In spite of the poorer yields relative to Fuji and Gala, gross revenue from Jonagold still exceeded the benchmark Red Delicious by the fourth leaf. The highest gross revenues were observed when densities were between 1500 and 2000 trees per acre.

Soft fruits

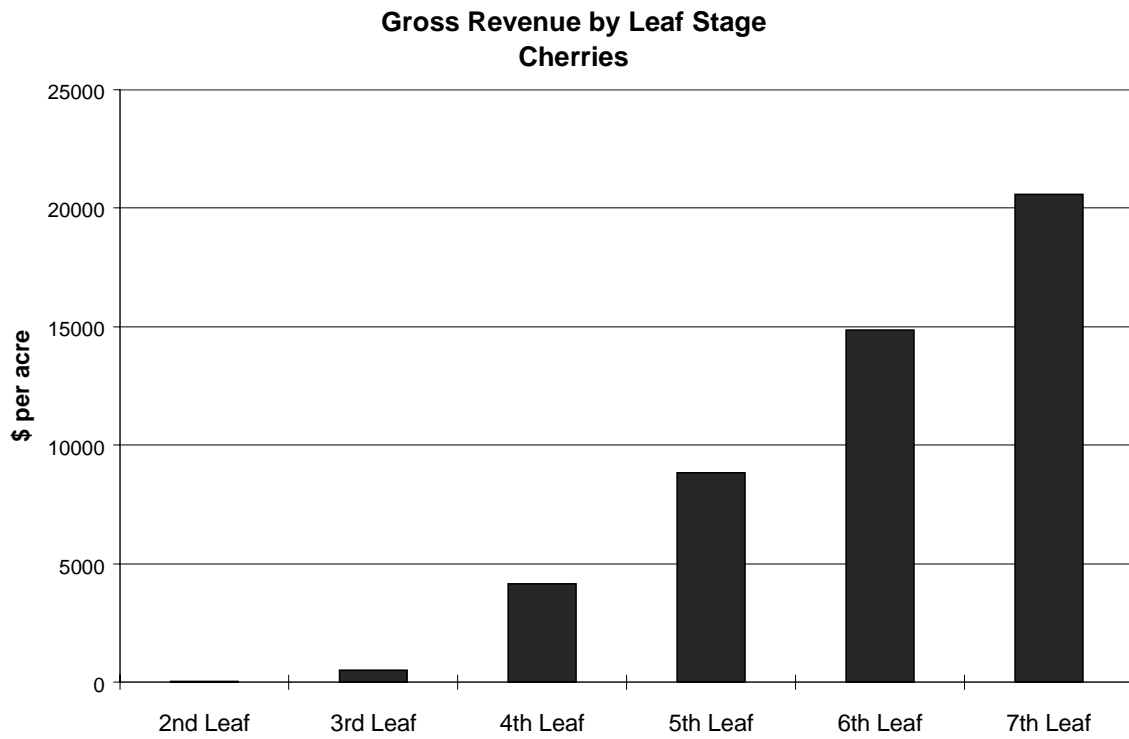
Sample size for both cherries and peaches was small so interpretation of the following data should be made with caution.

Cherries

GRAPH 12: Yield by Leaf Stage - Cherries



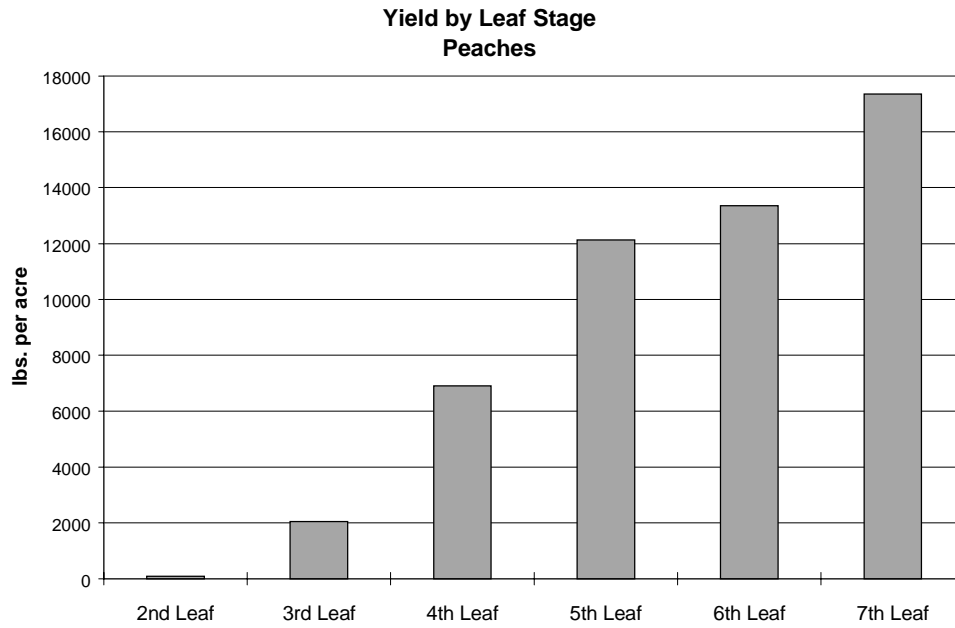
GRAPH 13: Gross Revenue by Leaf Stage - Cherries



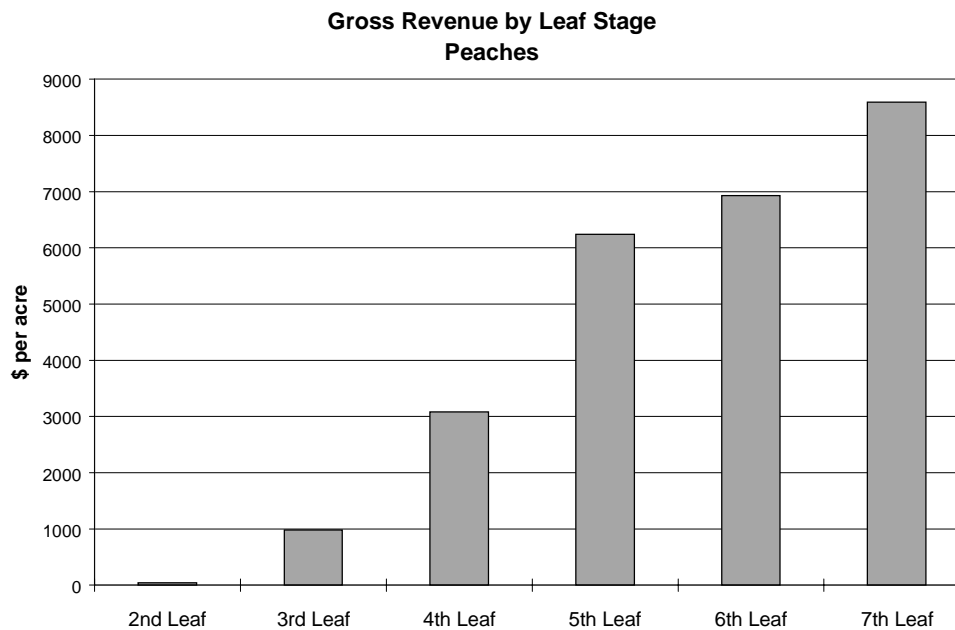
Graphs 12 and 13 show the yield and gross revenues for cherries. Cherries show a significant increase in gross revenues over the Red Delicious benchmark.

Peaches

GRAPH 14: Yield by Leaf Stage - Peaches



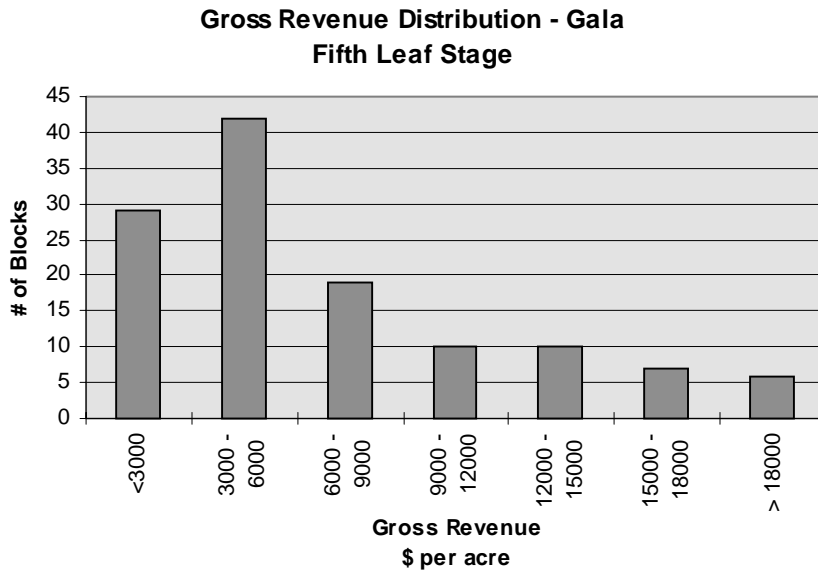
GRAPH 15: Gross Revenue by Leaf Stage - Peaches



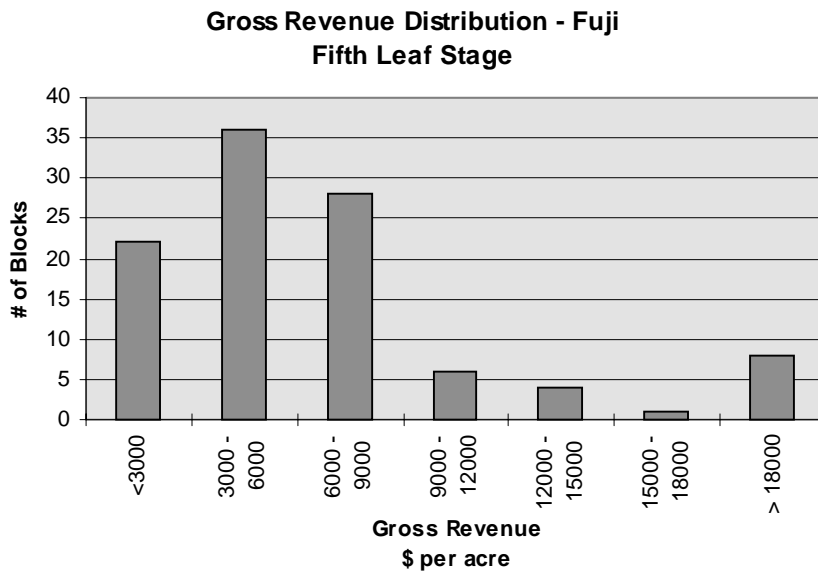
Graphs 14 and 15 show the yield and gross revenues for peaches. Peaches show a significant increase in gross revenues over the Red Delicious benchmark.

Distribution Graphs

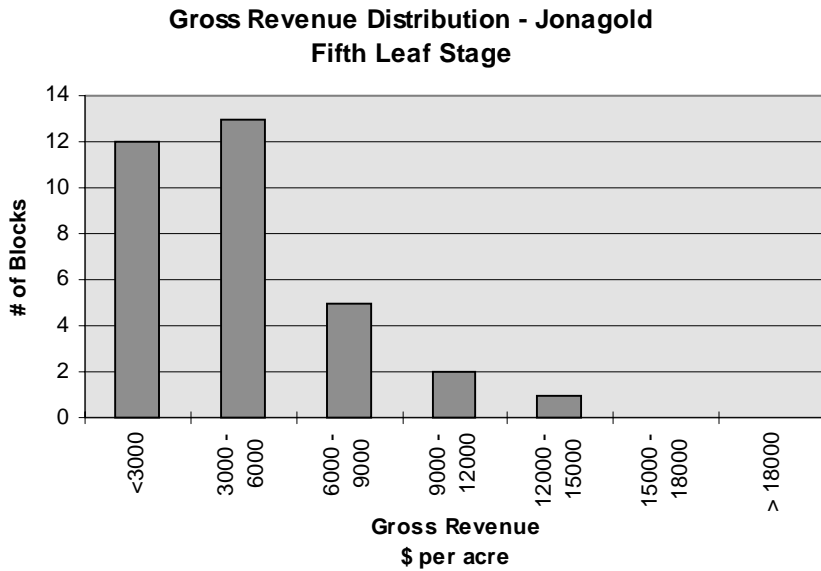
Graph 16



Graph 17



Graph 18

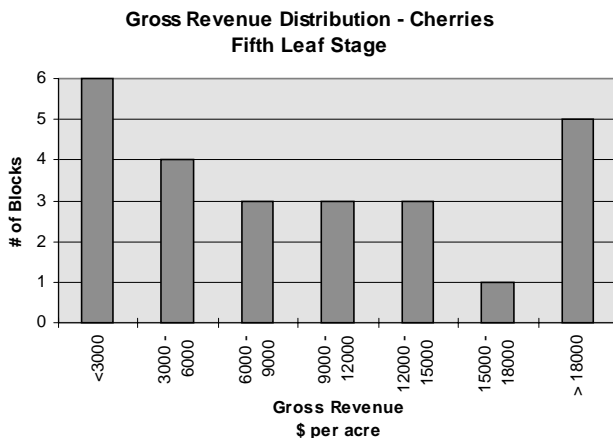


These distribution graphs illustrate the wide range of gross revenue for the blocks surveyed. A significant number of plantings are not successful. If we assume that blocks receiving less than \$3,000 per acre are not successful and that plantings greater than \$6,000 per acre are very successful, the following table indicates a measure of replant performance:

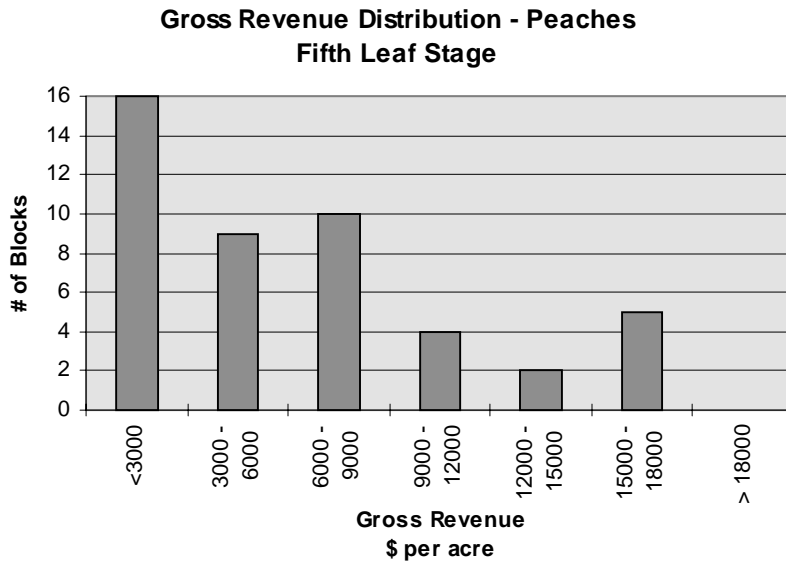
Distribution of Apple Blocks by Revenue

Variety	<\$3000	\$3,000-6,000	>\$6,000
Gala	21%	42%	37%
Fuji	20	38	42
Jonagold	12	64	24

Graph 19



Graph 20



Distribution of Cherries and Peaches by Revenue

Crop	<\$3,000	\$3,000-\$6,000	>\$6,000
Cherry	24%	16%	60%
Peach	35	18	47

Management Factors

As part of the survey, growers were asked the following questions:

Question	All growers responding	
	% Yes	% No
From a production point of view, do you feel this replant project was a success?	83	15
Was the quality of your nursery tree a factor?	81	16
Was your site or location a factor?	78	20
Was soil type a factor?	84	14
Did you fumigate?	23	74
Did you use soil amendments?	72	26
Did you deep rip your soil?	62	37
Did you fertigate?	51	47
Did you upgrade or install a new irrigation system?	93	6
If yes, was the system installed at the time of planting?	93	4
<u>Was the replant program a factor in your decision to replant?</u>	<u>85</u>	<u>14</u>

Numbers may not add up to 100 as some had no response

It is difficult to draw any conclusions from the survey questions except for the following:

- Most growers felt their replant project was a success.
- Tree quality, site of project and soil type is important
- Most growers did not fumigate
- Most did use soil amendments
- Many growers deep rip their soil prior to replanting
- About half of the projects were fertigated
- Almost all of the projects did install new irrigation systems at the time of planting
- 85% of the respondents indicated the replant program is a factor when deciding to replant.
- No significant differences were apparent for the management factors of the top one third growers and the average responses.

Summary and Conclusions

1. The survey indicates that the replanting program has assisted growers in producing some very successful replant projects. Very high gross revenues per acre for cherries and Gala apples for some projects indicate the potential for profitability. The success of these plantings has been achieved firstly by choosing a variety that has a high market demand and therefore price, and secondly, excellent horticultural practices to achieve high early yields of high quality fruit.
2. The reader should be cautioned when drawing conclusions from the potential revenue from these new plantings for the following reasons:
 - The high pricing these varieties have realized may not be reflected in the future as North American volumes of the varieties included in the survey increase.
 - Initial costs of replanting are high particularly with the higher densities and if the wrong variety is selected, then the replant project may not be economic. **More economic analysis is required to examine replant costs versus potential revenue.**
 - Successful replanting requires a high skill level from growers and some growers may need to improve their knowledge to successfully replant.
3. Apple yield is highly related to density. Observations from the survey indicate the following:
 - Low densities of less than 1,200 trees per acre do not realize the production and gross revenues of higher density plantings. This result probably means that the trees have not filled their space within the current time frame. Some growers argue that they will in time but the question remains: are they a viable replant proposition?
 - Highest yields come from plantings that exceed 1,500 trees per acre by the sixth year. It is apparent that these plantings have filled their space and have maximized their production early in the life of the planting. It is believed that these plantings have reached their maximum yield levels and that the yields after the sixth year will fluctuate according to weather and management factors.
 - Earlier yields come from higher density blocks. This result was expected, but is reassuring to see it realized. It also demonstrates the potential to capture the higher market returns for newer varieties.
4. Management factors are inconclusive in terms of identifying the critical steps to successful replanting. It is anticipated that the better managers achieve success by the right timing and careful application of management inputs to realize better growth and yields.
5. Gross revenue per acre is dependent on a number of factors:
 - Variety selection is considered highly important. Even with excellent horticultural skills and high production, choosing a less marketable

variety or a traditional variety will not produce sufficient gross revenues to pay for the high cost of replanting in a reasonable time frame. Since prices from the survey declined for all the varieties, the question to be answered by growers and the industry is “**What varieties will growers be able to plant in the near future that may have a reasonable expectation of returning a high enough price for the growers efforts?**”

- According to this survey, revenue per acre declines in years five and six for plantings that exceed 2,000 trees per acre. We have no explanation for this observation except that declining quality or fruit size may be happening as these very high densities mature. Further research needs to be done.
 - A very wide range of gross revenue distribution occurs in all varieties. Our survey indicates ranges of \$2116 per acre (bottom one third average) to a high of \$13,164 per acre (top one third average). The higher ranges show the potential of replanting. The wide range of yields at the same densities indicates the importance of using good horticultural practices when replanting. There is a need to further improve the skills of the growers.
6. Cherries and peaches show similar potential to apples. Gross revenue is lower in the first four years but equals apples in year five. **Care should be taken when analyzing cherries as price is dependent on the various marketing windows. The price reported by some growers may also include some packing and marketing costs.** Costs are also expected to be higher for cherries than apples.

Further Analysis

To assist with the analysis of the replant program, it is proposed that the following be completed as soon as possible:

1. An updated establishment cost analysis study to assess the profitability of different densities and commodities.
2. An analysis of apple packouts from blocks of 1500 - 2000 trees as contrasted to the blocks of >2000 trees per acre.
3. The development of a new variety introduction and development strategy.