

Estimated Costs of Producing Muscadine Grapes for Wine or Juice in North Carolina

***Muscadine Grape Workshop for
Cooperative Extension Service
Agents***

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Procedures

- ❖ Cost estimates were based on a 10 Acre vineyard
- ❖ Production practices were based on management practices recommended by Extension Specialists and Farmers
- ❖ Equipment costs were based on 2005 purchase prices
- ❖ Input prices were collected from farmers and dealers who supply NC grape growers

Objectives

- ❖ Estimate the cost of producing & harvesting muscadine grapes (wine grapes)
 - Enterprise Budget
- ❖ Evaluate the profitability of establishing a Muscadine grape vineyard
 - Cash Flow Analysis
 - Net Present Value
 - Internal Rate of Return

Production Systems

- ❖ Single-Wire Trellis (SWT)
 1. **Without irrigation**
 2. **With irrigation**
- ❖ Geneva Double Curtain (GDC)
 1. **Without irrigation**
 2. **With irrigation**

Yield Assumptions (tons/acre)

	SWT		GDC	
Year	Without irrigation	Irrigation	Without irrigation	Irrigation
0	0	0	0	0
1	0	0	0	0
2	0.8	1	1.04	1.25
3	2.4	3	3.12	3.74
4	6.4	8	8.32	10

Harvest Assumptions

- ❖ Harvest in September
- ❖ Grapes were sold for \$500 per Ton
- ❖ Custom harvest rate: \$100 per Ton
- ❖ Farmer provided a 60hp Tractor

Labor Costs

❖ Full time employees

- Wage rate: \$8.25/hour
- Required expenses: 2.31/hour
- Total cost: \$10.56/hour

❖ Trellis construction

- Part-time labor: \$8.25/hour

Machinery Costs/Equipment Investment

- ❖ Most of the machinery and equipment can be used for other farming operations
- ❖ Equipment cost estimates only reflect the costs associated with grape production
 - Based on estimated costs per hour
- ❖ Exceptions:
 - Irrigation equipment was used only for grapes
 - Grape hedger was assumed to be rented at \$85/hour

Equipment Requirements

	Purchase Price	Cost per hour*	Total Cost per hour
Tractor, 60 hp	\$ 25,000	\$ 7.81	\$ 11.91
Spot sprayer, 26 g	190	0.22	0.56
Fertilizer spreader	395	0.56	0.94
Tine chisel plow, 7'	2,500	1.54	3.23
Disk, 9'	3,500	1.85	4.21
Soil auger	498	0.46	1.30
Post driver	2,374	2.20	6.21
Utility trailer	2,000	0.70	2.39

* Cost Estimates do not include depreciation

Equipment Requirements, cont.

	Purchase Price	Cost per hour*	Total Cost per hour
Boom sprayer, 60G	700	0.41	1.03
Blast sprayer, 110G	4,000	5.90	9.460
Rotary mower, 7'	2,000	3.38	5.58
Pruning equipment	1,000	-----	-----
Grape hedger	-----	85.00	-----
Pickup truck, ½ ton	25,000	8.24	12.47
Drip Irrigation (SWT)	23,116	0.72	2.11
Drip Irrigation (GDC)	22,103	0.68	2.00

* Cost Estimates do not include depreciation

Grape Vines

SWT	Number	Cost
- Vines per acre	218	\$600
- Growth tubes per acre	218	\$140
- Replant: vines per acre	10	\$28
GDC		
- Vines per acre	182	\$500
- Growth tubes per acre	182	\$116
- Replant: vines per acre	10	\$28

Estimated Trellis Costs: SWT

	Qty	Cost
Materials		
- 4" x 8' Posts Treated	2,128	\$10,900
- 6" x 8' Posts Treated	528	3,696
- 4" x 4"x 6' Timbers	264	1,320
- Wire & Staples	-----	2,260
Equipment costs	-----	1,795
Labor costs	536 hrs	4,422
Total		\$24,393

Estimated Trellis Costs: GDC

	Qty	Cost
Materials		
- Posts	2,260	\$12,708
- 4"x 4"x 6' Timbers	220	1,100
- Other materials	-----	17,117
Total Materials	-----	\$30,924
Equipment costs	-----	1,500
Labor costs	828 hrs	6,831
Total		\$39,256

Estimated Annual Costs, Years 0 – 20th

Year	SWT		GDC	
	No Irrigation	Irrigation	No Irrigation	Irrigation
	-----\$/acre-----		-----\$/acre-----	
0	2,747	2,747	3,923	3,923
1	2,261	2,342	2,832	2,910
2	1,382	1,550	1,868	2,032
3	1,729	2,005	2,054	2,326
4-20	2,263	2,639	2,720	3,097

Break-even & Shutdown Prices

❖ Break-even Price

- Price that covers the estimated total cost
- Total cost = Fixed cost + Variable costs
- Profit = \$0.00

❖ Shutdown Price

- Price that covers only variable costs

Breakeven & Shutdown Prices

Production System	Yield	Net returns	Breakeven price	Shutdown price
	T/acre	\$/acre	-----\$/ton-----	
SWT w/o Irrigation	6.40	47	492	323
SWT w/ Irrigation	8.00	210	473	305
GDC w/o Irrigation	8.32	321	461	300
GDC w/ Irrigation	10.00	536	446	288

Estimated Returns: SWT w/o Irrigation

Price (\$/T)	Yields (tons/acre)					Break-even yield
	5.76	6.08	6.40	6.72	7.04	
300	-1,361	-1,297	-1,123	-1,169	-1,105	12.57
400	-785	-689	-593	-497	-401	8.27
500	-209	-81	47	175	303	6.28
550	79	222	367	511	655	5.58
600	367	527	687	845	1,007	5.03

Estimated Returns: SWT with Irrigation

Price (\$/T)	Yields (tons/acre)					Break-even yield
	7.20	7.60	8.00	8.40	8.80	
300	-1,550	-1,470	-1,390	-1,310	-1,230	14.95
400	-830	-710	-590	-470	-350	9.97
500	-110	50	210	370	530	7.48
550	250	430	610	790	970	6.65
600	610	810	1,010	1,210	1,410	5.98

Estimated Returns: GDC w/o Irrigation

Price (\$/T)	Yields (tons/acre)					Break-even yield
	7.49	7.9	8.32	8.74	9.15	
300	-1,509	-1,427	-1,343	-1,259	-1,177	15.03
400	-760	-637	-511	-385	-262	10.02
500	-11	153	321	489	653	7.52
550	364	548	737	926	1,111	6.68
600	738	943	1,153	1,363	1,568	6.01

Estimated Returns: GDC with Irrigation

Price (\$/T)	Yields (tons/acre)					Break-even yield
	8.99	9.48	9.98	10.48	10.98	
300	-1,664	-1,564	-1,464	-1,364	-1,264	17.32
400	-764	-614	-464	-314	-164	11.55
500	136	336	536	736	936	8.51
550	586	811	1,036	1,261	1,486	7.70
600	1,036	1,386	1,536	1,786	2,036	6.93

Profitability

- ❖ Important to see when the dollars come in and the returns available in other enterprises
 - The sooner a dollar comes in, the sooner it can be used to earn more revenue
 - For any two enterprises of equal risk, the one yielding the higher rate of return is usually preferable

Net Cash Flow – SWT

Years	No Irrigation	Irrigation
0	-3,839	-3,839
1	-2,833	-5,225
2	-982	-1,050
3	-529	-505
4	937	1,361
5	937	1,361

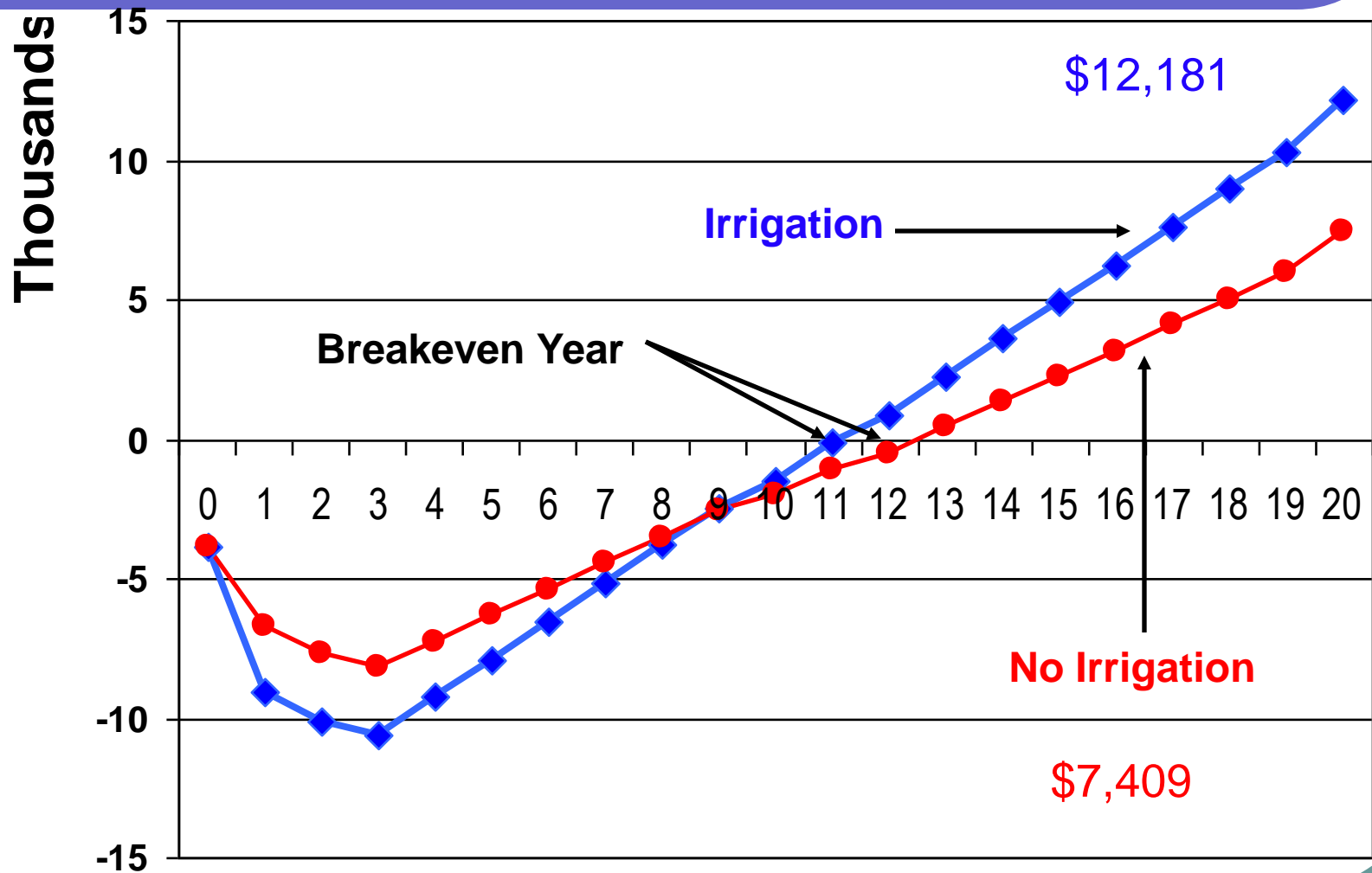
Accumulated Cash Flow – SWT

Years	No Irrigation	Irrigation
0	-3,839	-3,839
1	-6,672	-9,064
2	-7,654	-10,114
3	-8,183	-10,619
4	-7,246	-9,258
5	-6,309	-7,897
6	-5,372	-6,536
7	-4,435	-5,175
8	-3,498	-3,814
9	-2,560	-2,453
10	-2,028	-1,497
11	-1,091	-136
12	-509	870
13	428	2,231

Break-even Year

- ❖ The year when enough revenue has been generated to cover start-up expenses.
- ❖ To secure a loan of shorter duration could leave the farming operation insolvent.

Accumulated Cash Flows –SWT



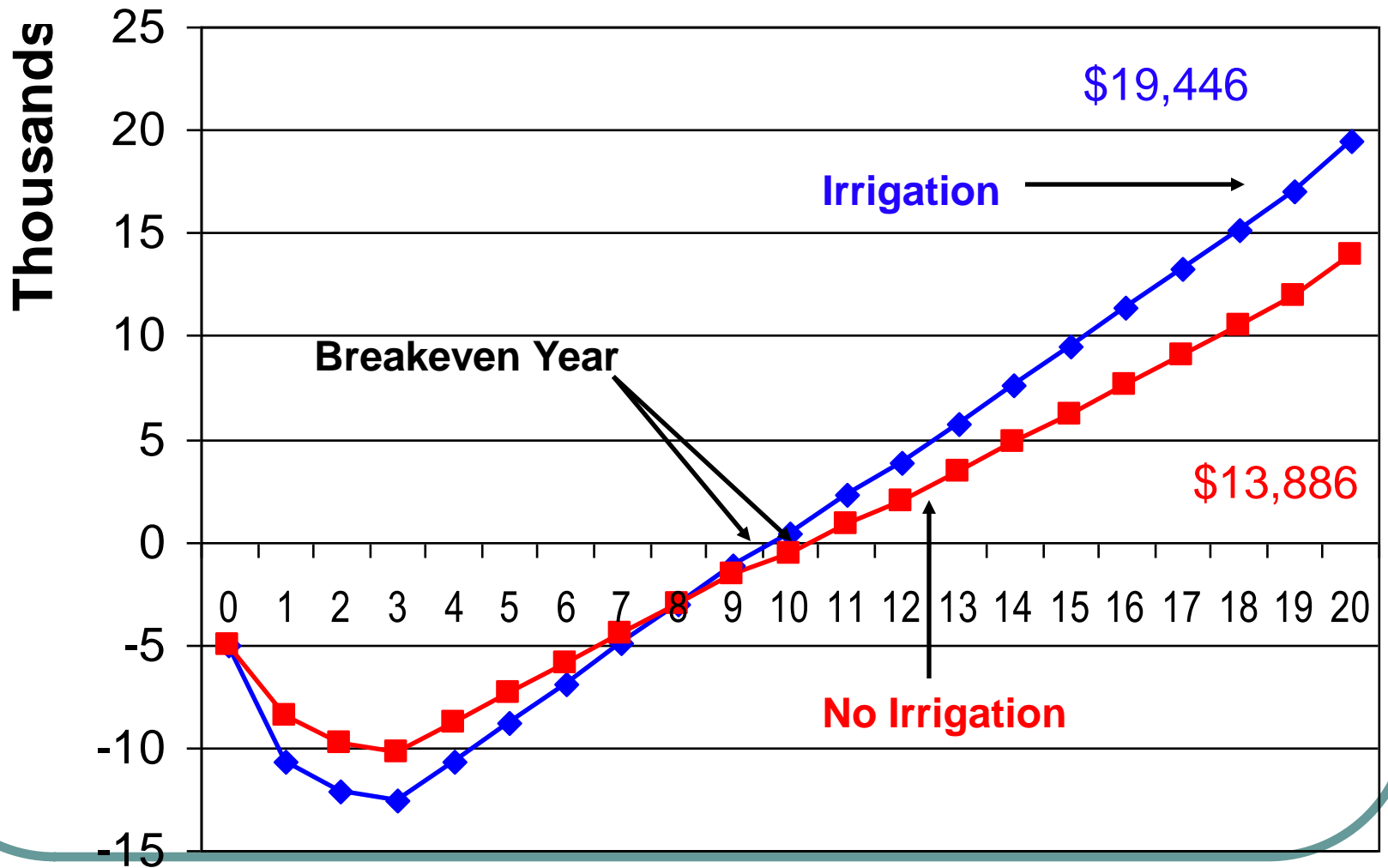
Net Cash Flow – GDC

Years	No Irrigation	Irrigation
0	-5,015	-5,015
1	-3,403	-5,692
2	-1,348	-1,408
3	-494	-454
4	1,440	1,903
5	1,440	1,903

Accumulated Cash Flow – GDC

Years	No Irrigation	Irrigation
0	-5,015	-5,015
1	-8,418	-10,707
2	-9,766	-12,115
3	-10,260	-12,569
4	-8,820	-10,666
5	-7,380	-8,763
6	-5,940	-6,860
7	-4,499	-4,957
8	-3,059	-3,054
9	-1,619	-1,151
10	-584	347
11	856	2,250
12	1,942	3,798
13	3,381	5,702

Accumulated Cash Flows – GDC



Net Present Value

- ❖ Today's cash equivalent value of the 20 year vineyard.
- ❖ Assumes you can invest money at a given interest rate
- ❖ “Best” interest rate is low risk alternative, e.g. long term certificate of deposit
- ❖ Essence is the enterprise should be accepted if the $NPV > \$0$

Net Present Value

Production System	NPV
Single-wire trellis	
- Without Irrigation	\$ 135
- With Irrigation	\$1,567
Geneva Double Curtain	
- Without Irrigation	\$2,551
- With Irrigation	\$4,443

Today's Cash Equivalent

- ❖ A new 10A muscadine grape vineyard on GDC trellis system with irrigation is worth \$4,443 today
- ❖ Someone would have to pay a farmer \$ 4,443 to bribe him to forget his plans of establishing a 10A muscadine grape vineyard
- ❖ One could pay up to \$444 per acre for good muscadine grape soil and still do as well as in other investments

Internal Rate of Return

Production System	IRR
Single-wire trellis	
- Without Irrigation	6.18%
- With Irrigation	7.58%
Geneva Double Curtain	
- Without Irrigation	8.54%
- With Irrigation	9.54%

Internal Rate of Return

- ❖ Compared to a Treasury bond that yields 4.98%:
 - A muscadine grape vineyard on a GDC trellis system with an IRR of 9.54% looks pretty good.
 - A planting on SWT system w/ irrigation that has an IRR of 6.18% - 7.58% is not as attractive when you consider the risk and amount of time associated with grape production

“Limited” Sensitivity Analysis

❖ Assumed:

- No yield in the 13th year of production
- Loss of production was known early enough in the production season, so the grower could adjust her/his costs accordingly
- Maintenance cost of \$250/a

Net Present Value

System	Previous NPV	“New” NPV	%Δ
SWT:			
- No Irrigation	\$ 135	- \$ 421	-----
- Irrigation	\$1,567	\$ 812	- 48%
GDC:			
- No Irrigation	\$2,551	\$1,758	- 31%
- Irrigation	\$4,443	\$3,434	- 23%

Internal Rate of Return

System	Previous IRR	“New” IRR
SWT:		
- No Irrigation	6.18%	5.41%
- Irrigation	7.58%	6.85%
GDC:		
- No Irrigation	8.54%	7.82%
- Irrigation	9.54%	8.85%

Conclusions

- ❖ A new 10A muscadine grape vineyard can be a profitable venture under these assumptions
 - Price
 - Cost
- ❖ Rank of production systems:
 1. GDC with Irrigation
 2. GDC without irrigation
 3. SWT with irrigation
 4. SWT without irrigation

System's Rank Based on:

System	Bkn Yr	NPV	IRR
GDC			
- Irrigation	10 th	\$ 4,443	9.54%
- No Irrigation	11 th	\$ 2,551	8.54%
SWT			
- Irrigation	12 th	\$ 1,567	7.58%
- No Irrigation	13 th	\$ 135	6.18%

!! CAUTION !!

- ❖ Budgets are only guides – not substitutes for a grower's own cost estimates
 - ❖ Yield patterns assumed no adverse weather, production setbacks or marketing difficulties
- ➔ Recommended that each grower estimate their production and harvest costs & conduct a profitability analysis based on their own production techniques and price expectations.

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