

Muscadine Workshop for Cooperative Extension Agents, Sept 13 -15, 2006

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2005

Muscadine Agent Training Sponsored by:









NORTH CAROLINA WINE & GRAPE COUNCIL

WINERY

Muscadine Grape Workshop for Cooperative Extension Service Agents

September 13-15, 2006 Duplin County Center Kenansville, NC Overview of muscadine acreage, cultivars and production areas in the southeastern US

Bill Cline, Plant Pathology Connie Fisk, Horticultural Science North Carolina State University



Muscadine (Vitis rotundifolia)

- Native woody vine
- Dioecious (polygamous), but with some perfectflowered cultivars
- Round, serrate leaves
- Unbranched tendrils
- Fruit in small clusters
- Grapes abscise when ripe, picked singly
- Thick-skinned, seeded, edible fruit



"Muscadines have played a long and interesting role in the history and sociology of the southeastern United States, and they have strong personal associations for those who grew up in the region"

(Olien, 2001)







Approximate native range and commercial distribution of muscadine grapes (after Olien and Hegwood, 1990; Basiouny and Himelrick, 2001)

Estimated muscadine grape acreage in the southeastern US (*V. rotundifolia* only)

STATE	ACRES	COMMENTS
Alabama	<75	Mostly fresh, wine use increasing
Arkansas	400 - 500	Includes juice (Post Familie Vineyards)
Florida	600-1,000	Most for wine – 'Noble' most popular
Georgia	1,400	Mostly fresh; some wine (in-state and out-of-state)
Louisiana	70	51 acres fresh, 19 "commercial" (KATRINA)
Mississippi	300	Mostly fresh-market (KATRINA)
North Carolina	1,300	Primarily 'Carlos' for wine; some fresh
Oklahoma	<50	S. E. counties
South Carolina	300	Mostly fresh; plantings for wine increasing
Tennessee	160	65-70% grown for for wine
Texas	<50	Mainly E. Texas
Virginia	<50	Tidewater region

NC Muscadine production

WEST Dr. Harvey Fo

Haywoo Henden Jackson Macison Macison Mitchell Swein Transyh Wetaug Yancey

April 2006

Catawb Clevela Clevela



Cultivars vary widely in color, size and suitability for fresh market or wine production



Barriers to increased production

- Wine/Juice -- Slim profit margins, limited market and fluctuating prices
- Fresh Seeds, and unfamiliar fruit texture -- "how do you eat this thing?"
- Vine survival -- Lack of cold hardiness, intolerance of wet sites



Assets and Opportunities

- Health benefits muscadines are high in antioxidants, and "Superfoods" are hot!
- Muscadines are resistant to Pierce's Disease and other plant pathogens
- Unique, aromatic sensory qualities
- Organic muscadines
- Big chain stores seeking "local flavor"



"Top Twelve" Cultivars?

- CARLOS (pf, brz)
- NOBLE (pf, blk)
- DOREEN pf, brz)
- ISON (f, blk)
- MAGNOLIA (pf, brz)
- GRANNY VAL (pf, brz)

- FRY (f, brz)
- TRIUMPH (pf, brz)
- NESBITT (pf, blk)
- SUPREME (f, blk)
- PAM (f, brz)
- SUMMIT (f, pk brz)

Honorable mention: 'SOUTHERN HOME'



CARLOS (NCSU, 1970)

- Self-fertile
- Highly productive
- Dry scar
- Best cultivar for wine
- +90% of NC acreage
- Non-edible skin
- Not highly rated for fresh market (does not chill well, small size)





NOBLE (NCSU, 1974)

- Very productive
- Self-fertile
- Stable pigments
- Small size
- Wet scar
- #1 muscadine used for wine in Florida





Fresh-market cultivars include 'FRY' (brz) 'SCARLETT' (red), 'SUPREME' (blk) and many others

- Most are female flowered
- Large fruited
- Variable productivity
- Susceptible to rots
- Edible skin
- Firm flesh
- May rain-split
- Low vigor and lack of cold-hardiness can be problems





Southern Home

- Patented
- Complex parentage
- Ornamental value,
 "fig-leaved"
- Edible fruit
- Disease resistant (except for Powdery Mildew)





Active breeding programs

- University of Georgia
- USDA at Poplarville, MS
- Florida A&M
- Jeff Bloodworth (Hillsborough, NC)

Others?



Open-pollinated seedlings – seed collected from a single large-fruited black vine in a mixed planting:











Examples of muscadine products

- http://www.nutragonllc.com
- http://www.duplinwinery.com
- http://www.postfamilie.com
- http://dennisvineyards.com
- http://www.lebleu.com
- http://bannermanvineyard.com



Web resources

- http://www.smallfruits.org
- http://www.uark.edu/depts/agripub/Publica tions/bulletins/974.pdf
- http://www.ashs.org/ashspress/mgrapes.ht
 ml
- http://www.aces.edu/pubs/docs/A/ANR-0774/ANR-0774.pdf



2006 Muscadine Agent Training Sponsored by:











North Carolina Wine & Grape Council

Muscadine Training, Pruning and Canopy Management

SRSFC Agent Training E. B. Poling Sept. 13, 2006



College of Agriculture & Life Sciences



Vertical Single Wire



Two-wire "vertical" trellis with 4 arms/vine



Removing the lower two arms at dormant pruning



Photo compliments of B. Faulkner, Wayne Co. CES

Two wire (horizontal) training system



Overhead arbors



North Carolina System



Muscadines – were allowed to grow wild until early 1900's

Vitis rotundifolia





Trellising not introduced until 1907

Single trunk vines: cordon support systems



Slide 8

3. Geneva Double Curtain (GDC)

Photo of GDC

Initial Training Goals

- Year 1 rooting, trunk establishment
- Year 2 straight trunk, strong arms
- Year 3 complete the training

Training in First Year





AG-94

Second Year

- 1. Single Trunk
- 2. Permanent arm (cordon)
- 3. Harvest light crop







7. Framework of vine.

Slide 11

Fruiting Habit of Muscadines

- Source of fruiting wood?
- Bud location
- Selecting quality wood

Slide 11a

Fruiting Habit & Pruning



Slide 11 b
New shoot (early May)



Count bud on spur (1 yr wood)

Late September – before harvest in piedmont, NC

The shoots in this canopy were summer pruned (shortened); otherwise the shoots would reach the ground.



Bud forms in leaf axil



Growing season



Dormant season Slide 14

Close-up 1 year wood (cane)



Definition

Cane – growth of the current season or shoots that have become woody

Close-up: Single bud on 1 yr. wood & new shoot



Flower cluster

Single bud (winter)

Shoot from single bud (next growing season)

1 year wood and buds



Weak (top) vs. healthy (bottom) 1 year wood





Using hedgers to pruning away unwanted 1 year wood, and to "shape the vine" so that the zone of fruitful 1 year wood is inside the imaginary circles on each arm

Pruning away excess 1 year wood

Before and After



Best time to prune?



You will not see "bleeding" from pruning cuts in Dec-Jan-early Feb

Final Analysis for Viticultural Suitability in North Carolina



Pruning cut-off date?



Bleeding from pruning cuts will not harm the vine

Basic Tools Needed







1st winter – prune back to just 1 bud



4-inch spur (2-3 buds)



Second Winter Dormant Pruning

Close-up of fruit spur







7. Framework of vine.

Mature healthy vine

Cordon of a healthy 5 year old vine – each year the 1 year 'fruiting spurs' move further from the cordon



Older vine with less fruitful "bearers"



Problems – older vines





Candidate for cordon renewal in another year?



Putting it all together!



Vertical Single Wire – Research Questions



Severe pruning →200 buds/vine →100 buds/arm →20 spurs/arm →5 buds/spur





Slide 38 a

Hedged Only (600 bud/arm)



Γ	Retained	Spur	Spacing	6 inch	8 inch	10 inch	12 inch	
	Buds	Buds/10ft	Buds/ft ^z	20	15	12	10	BEARERS/10 ft
	150	75	7.5	3.75	5.00	6.25	7.50	
	Fresh200	100	10	5.00	6 67	8 33	10.00	
	116311200	100	10	0.00	0.07	0.00	10.00	
	250	125	12.5	6.25	8.33	10.42	12.50	
	Proc_300	150	15	7.50	10.00	12.50	15.00	
	350	175	17.5	8.75	11.67	14.58	17.50	
	Mech_400	200	20	10.00	13.33	16.67	20.00	
	450	225	22.5	11.25	15.00	18.75	22.50	
	500	250	25	12.50	16.67	20.83	25.00	
						_5.00	_0.00	
	800	400	40	20.00	26.67	33.33	40.00	

Slide 39

^z (4-6 shoots are recommended per ft vienyard row in bunch grapes)

Extension Pruning Demonstrations









Estimated Production Costs, Gross Revenues, and Returns per Acre for Muscadines Grapes Grown for the Wine and Juice Markets Single Wire Trellis System with No Irrigation

Revised: November 2006

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This budget presents the estimated costs of producing and harvesting muscadine grapes for the wine and juice markets in North Carolina, an investment analysis of muscadine grape production, and the effects of varying wholesale prices and yields on returns to land and management. The budget was developed for a representative 10 acre grape vineyard assuming a single wire trellis (SWT) without irrigation. It was also assumed that the management of the vineyard would be near optimal and that all recommended practices would be followed. This information can be useful for farmers considering starting a new muscadine grape vineyard or expanding an existing operation. Mention of a product or vendor does not constitute a guarantee or warranty of the product, nor does it imply recommendation of one product over another. Other products may also be suitable depending on soils, weather conditions, farm history, and pest pressures

Budget Contents

Monthly and annual cost estimates by operation

- Site Preparation
- Year 1: Planting Year
- Year2: First Harvest Year
- Year 3: Second Harvest Yes
- Years 4 through 20: Full Production
- **Trellis Construction Costs**

Monthly Cost Summary

Monthly Labor Requirement Summary

Investment Analysis

Estimated Costs and Returns for Varying Yields and Wholesale Prices

Estimated Production Costs per Acre for Muscadine Grapes Grown for the Wine and Juice Markets, Single Wire Trellis System with Drip Irrigation Site Preparation

August	Attend Grower Meetings Apply Herbicide	Costs	COSTS	Costs	Costs	Costs
August A	Attend Grower Meetings Apply Herbicide		5.00			
August	Attend Grower Meetings Apply Herbicide		5.00			
r	Apply Herbicide		F S I H H	8 / 5	13.45	
/		3 / 3	5.00	5.28	8 71	
<i>,</i>		5.45	17 50	5.20	17.50	
Total Augus	giyphosate	\$3.43	\$22.50	\$13.73	\$39.65	
November	e de la companya de la	ψ0.40	φ22.00	ψ15.75	φ39.05	
F	Now Field	12 31		13 94	26.25	
, г		5 31		6 97	12.20	
Ĺ)rder & Plant cover crop	2 93	50.00	0.37 1 11	57.36	
	Apply Nutrients	2.00	30.00	т.тт Л ЛЛ	7 36	
F		2.55	77.00		7.00	
	Triple Superphosphate		20.40		20.40	
C	Order plants		599.50	2 64	602 14	
Total Noven	iber	\$23.48	\$746.90	\$32.42	\$802.80	
December		¢20.10	¢1 10.00	Ψ02.12	\$002.00	
(Order trellis supplies*		1 817 60	10 56	1 828 16	
Total Decen	ber	\$0.00	\$1,817.60	\$10.56	\$1.828.16	
Annual Admi	nistrative Costs	<i>v</i> v	<i><i><i>v</i></i>,<i>v</i>,<i>v</i>,<i>v</i>,<i>v</i>,<i>v</i>,<i>v</i>,<i>v</i>,<i>v</i>,<i></i></i>		<i><i><i>v</i></i>,<i>o</i>_0<i>o</i>_</i>	
F	Real Estate Taxes		0.00		0.00	
N	/anagement Fee		0.00		0.00	
1	Net Land Rent		0.00		0.00	
Ν	liscellaneous		20.00		20.00	
(Overhead (Utilites, legal fees, etc.)		15.00		15.00	
Total Annua	I Administrative Costs	\$0.00	\$35.00	\$0.00	\$35.00	
Seasonal Co	sts					
1	/2 Ton Pick-up	16.48		25.34	41.82	
C	Dperating Capital		0.00		0.00	
Total Seaso	nal Costs	\$16.48	\$0.00	\$25.34	\$41.82	
TOTAL SITE	PREPARATION	\$43.38	\$2,622.00	\$82.05	\$2,747.43	

Estimated Materials Costs for a Single Wire Trellis for a 10-Acre Vineyard

Trellis Materials	Rate/ Acre	Unit	Cost per Unit	Total Cost	Your Cost
Treated 4" x 8' Posts Treated 6" x 8' Posts Treated 4" x 4"x 6' Timbers Wire, 100-pound rolls of # 9 galvanized Staples	2180 528 264 30 50	ea ea rolls lbs	5.00 7.00 5.00 74.00 0.80	10,900.00 3,696.00 1,320.00 2,220.00 40.00	
Total Trellis Materials Cost			I	\$18,176.00	

Estimated Construction Costs for a Single Wire Trellis for a 10-Acre Vineyard

	Equipment	Materials	L	abor	Total	Your
Operation	Costs	Costs	Hours	Costs	Costs	Cost
Materials Cost		18,176.00			18,176.00	
Mark rows and post locations			40	330.00	330.00	
Distribute posts	340.38		40	330.00	670.38	
Drive line posts (2 workers @ 3min/post)	1,091.04		218	1,798.50	2,889.54	
Auger and set end posts (2 workers @ 5 min/post)	363.93		88	726.00	1,089.93	
Build Trellis			150	1,237.50	1,237.50	
TOTAL COSTS	\$1,795.35	\$18,176.00	536	\$4,422.00	\$24,393.35	

Estimated Production Costs per Acre for Muscadine Grapes Grown for the Wine and Juice Markets, Single Wre Trellis System without Irrigation First Year: Planting and Trellis Construction

		Equipment	Materials	Labor	Total	Your
Month	Type of Operation	Costs	Costs	Costs	Costs	Costs
January						
Total Janu	ary	\$0.00	\$0.00	\$0.00	\$0.00	
February Total Febru	uary	\$0.00	\$0.00	\$0.00	\$0.00	
March	,					
	Build Trellis	179.53		442.20	621.73	
Total Marc	Auger vine holes ¹	\$184.56	\$0.00	230.21 \$672.41	\$856.97	
April	•	ψ104.00	φ0.00	ψ072. 1 1		
•	Order Prunning Equipment			10.56	10.56	
	Plant vines (2 min/vine)			77.09	77.09	
Total April		\$0.00	\$0.00	\$87.65	\$87.65	
way	Order & Replant ²		30.25	10.56	40.81	
	Growth tube installation		139.52	42.24	181.76	
	Fertilize	4.12		6.34	10.46	
	10-10-10	0.40	6.54	5.00	6.54	
	Apply Herbicide	3.42	37 50	5.28	8.70 37.50	
	Train/Prune (8 min/vine)	0.00	57.50	304.13	304.13	
	Mow alleys	5.59		6.34	11.93	
Total May		\$13.14	\$213.81	\$374.88	\$601.83	
June	A	0.40		5.00	0.70	
	flumioxazin + paraquat	3.42	50 70	0.20	6.70 50.70	
	Fertilize	4.12	00.10	6.34	10.46	
	10-10-10		6.54		6.54	
	Train/Prune (4 min/vine)	0.00		152.06	152.06	
Total luna	Mow alleys (2X)	11.19	¢57.04	12.67	23.86	
July		φ10. <i>1</i> 3	φ01.24	φ170.35	φ202.00	
ouly	Fertilize	4.12		6.34	10.46	
	10-10-10		6.54		6.54	
	Apply Insecticide	3.42	0.00	5.28	8.70	
	Chiorpyritos (Lorsban 4E)	0.00	9.00	152.06	9.00	
	Mow alleys (2X)	11.19		12.67	23.86	
Total July		\$18.73	\$15.54	\$176.35	\$210.63	
August						
	Attend Grower Meetings	2 4 2	5.00	8.45	13.45	
	sethoxydim (Poast 1.5 EC)	3.42	17.06	5.20	8.70 17.06	
	Mow alleys	5.59		6.34	11.93	
Total Augu	ıst	\$9.02	\$22.06	\$20.06	\$51.15	
September					04.40	
Total Sent	Growth tube removal	\$0.00	\$0.00	\$21.12 \$21.12	\$21.12 \$21.12	
October - D	December	φ0.00	ψ0.00	ΨΖ Ι.ΙΖ	ΨΖ Ι.ΙΖ	
	Apply Herbicide (spot spray)	3.35		5.28	8.63	
	glyphosate		17.50		17.50	
Total Octo	ber - December	\$3.35	\$17.50	\$5.28	\$26.13	
	Real Estate Taxes		0.00		0.00	
	Management Fee		0.00		0.00	
	Net Land Rent		0.00		0.00	
	Miscellaneous		40.00		40.00	
	Overhead (Utilities, legal fees, etc)		30.00		30.00	
Total Annu	al Administrative Costs		0.00 \$70.00		\$70.00	
Seasonal C	Costs		 ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		<u>_</u>	
	1/2 Ton Pick-up	32.96		50.69	83.64	
	Operating Capital		0.00		0.00	
I otal Seas	onal Costs	\$32.96	\$0.00	\$50.69	\$83.64	
TOTAL FIR	ST YEAR COSTS	\$280.49	\$396.15	\$1,584.79	\$2,261.44	

Notes:

¹Auger vine holes: 2 workers @ 3 min/vine ²Order & Replant 5% of the initial plants

Estimated Production Costs per Acre for Muscadine Grapes Grown for the Wine and Juice Markets, Single Wire Trellis System without Irrigation Second Year: First Harvest (yield = 0.8 tons per acre)

		Equipment	Materials	Labor	Total	Your
Month	Type of Operation	Costs	Costs	Costs	Costs	Costs
January		0.00		200.40	000.40	
Total Janua	Dormant Pruning (Tumin/vine)	0.00	¢0.00	\$290.16	\$290.16	
February	u y	ψ0.00	ψ0.00	φ300.10	φ300.10	
Total Febru	ary	\$0.00	\$0.00	\$0.00	\$0.00	
March						
	Fertilize	4.12		6.34	10.46	
	10-10-10		13.08		13.08	
	Apply Herbicide	3.42	55.00	5.28	8.70	
Total Manak	flumioxazin (Chateau)+gl	yphosate	55.88	¢11 co	55.88	
		φ <i>1</i> .04	\$00.90	φ11.0Z	<u>۵00.11</u>	
, thu	Mow allevs	5.59		6.34	11.93	
Total April		\$5.59	\$0.00	\$6.34	\$11.93	
May						
	Fertilize	4.12		6.34	10.46	
	10-10-10		13.08		13.08	
	Train/Prune (8 min/vine)	0.00		304.13	304.13	
Total Mari	mow alleys	5.59	¢40.00	6.34	\$220.50	
June		\$9.71	\$13.08	\$310.8U	\$339.59 	
Suno	Leaf Analysis		4.00	2.64	6.64	
	Apply Herbicide	3.42		5.28	8.70	
	flumioxazin + glufosinate	(Rely)	111.50		111.50	
	Mow alleys (2X)	11.19		12.67	23.86	
Total June		\$14.61	\$115.50	\$20.59	\$150.71	
July						
	Fertilize	4.12	10.00	6.34	10.46	
	10-10-10 Apply Incosticido	2 4 2	13.08	E 20	13.08	
	chlorovrifos (Lorsban 4E)	3.42	7 75	J.20	7 75	
	Mow alleys (2X)	11.19	1.15	12.67	23.86	
Total July		\$18.73	\$20.82	\$24.29	\$63.84	
August						
	Attend Grower Meetings		5.00	8.45	13.45	
	Apply Herbicide	5.48		8.45	13.93	
	sethoxydim (Poast 1.5 EC	C)	17.06		17.06	
Total August	Mow alleys (1) (30' min/acre)	£11.07	¢00.06	6.34	11.93	
Sentember	st	φ11.0 <i>1</i>	\$22.00	\$Z3.Z3	\$00.3 <i>1</i>	
Cepternber	Custom harvesting ¹	87.81		2.64	90.45	
Total Septe	mber	\$87.81	\$0.00	\$2.64	\$90.45	
October						
	Apply Herbicide (spot spray)	3.35		5.28	8.63	
	glyphosate		17.50		17.50	
Total Octob	er	\$3.35	\$17.50	\$5.28	\$26.13	
November	Popair Trollis			01 40	01 40	
Total Nove	nepair freilis	\$0.00	\$0.00	\$21.12	\$21.12	
December		φ0.00	ψ0.00	Ψ21.12	Ψ21.12	
Total Decer	nber	\$0.00	\$0.00	\$0.00	\$0.00	
Annual Adm	inistrative Costs					
	Real Estate Taxes		0.00		0.00	
	Management Fee		0.00		0.00	
	Net Land Rent		0.00		0.00	
	wiscellaneous		40.00		40.00	
	Interest on Accumulating Investment		0.00 0.00		0.00	
Total Annua	al Administrative Costs	\$0.00	\$70.00		\$70.00	
Seasonal Co	osts	÷				
	1/2 Ton Pick-up	32.96		50.69	83.64	
	Operating Capital		0.00		0.00	
Total Seaso	onal Costs	\$32.96	\$0.00	\$50.69	\$83.64	
TOT /		\$404.00	#007 00	¢000 75	¢4.000.00	
TOTAL SEC	UND TEAR CUSIS	\$191.39	\$327.92	\$862.75	\$1,382.06	

Notes:

¹Custom harvesting: Grower provides a 60 HP tractor
Estimated Production Costs per Acre for Muscadine Grapes Grown for the Wine and Juice Markets, Single Wire Trellis System without Irrigation Third Year: Second Harvest (yield = 2.4 tons per acre)

Month	Type of Operation	Equipment Costs	Materials Costs	Labor Costs	Total Costs	Your <u>Cost</u> s
January	Dormant mechanical pruning	255.00			255.00	
	Dormant pruning (10min/vine)	0.00		380.16	380.16	
Total Janua	iry	\$255.00	\$0.00	\$380.16	\$635.16	
ebruary						
otal Febru	ary	\$0.00	\$0.00	\$0.00	\$0.00	
March		0.00		0.47	5.00	
	Fertilize	2.09	10.62	3.17	5.26	
	Apply Herbicide	3.42	19.02	5.28	8.70	
	flumioxazin (Chateau) +ol	vphosate	55.88	0.20	55.88	
otal March	1	\$5.52	\$75.50	\$8.45	\$89.46	
April						
	Mow alleys	5.59		6.34	11.93	
otal April		\$5.59	\$0.00	\$6.34	\$11.93	
lay						
	Fertilize	2.09	40.00	3.17	5.26	
	10-10-10	F 70	19.62	F 00	19.62	
	Apply Insecticide (Prebloom)	5.72	6 30	5.28	6.30	
	Apply Fungicide	5.72	0.00	5.28	11.00	
	mvclobutanil (Nova 40 W)		12.00		12.00	
	Mow alleys	5.59		6.34	11.93	
otal May		\$19.12	\$37.92	\$20.07	\$77.11	
une						
	Leaf Analysis		4.00	2.64	6.64	
	Apply Herbicide	3.42		5.28	8.70	
	flumioxazin + glufosinate ((Rely)	111.50		111.50	
	Apply Insecticide	5.72	7.07	5.28	11.00	
	Carbaryi (Sevin 80 WP)	5 72	7.87	E 20	11.00	
	captan (Captan 50 WP)	5.72	13 60	5.20	13.60	
	Mow allevs (2X)	11.19	10.00	12.67	23.86	
Total June		\$26.04	\$136.98	\$31.16	\$194.18	
luly						
	Fertilize	2.09		3.17	5.26	
	10-10-10		19.62		19.62	
	Apply Insecticide	3.42		5.28	8.70	
	chlorpyrifos (Lorsban 4E)		9.00		9.00	
	Apply Fungicide	5.72	40.00	5.28	11.00	
	Captan (Captan 50 WP)	11 10	13.60	12.67	23.86	
Total July	Now alleys (2x)	\$22.42	\$42.22	\$26.40	\$91.05	
August			•			
	Attend Grower Meetings		5.00	8.45	13.45	
	Apply Herbicide	3.42		5.28	8.70	
	sethoxydim (Poast 1.5 EC	;)	17.06		17.06	
	Mechanical prunning (summer)	127.50			127.50	
	Mow alleys	5.59		6.34	11.93	
Total Augus	st	\$136.52	\$22.06	\$20.06	\$178.65	
september	Custom baryosting	247 04		264	250 AF	
Total Sonto	mber	\$247.81	\$0.00	\$2.64	\$250.45	
October	inser	φ 2 47.01	\$0.00	φ 2.0 4	φ200.40	
	Apply Herbicide (spot sprav)	3.35		5.28	8.63	
	glyphosate		17.50		17.50	
otal Octob	ber	\$3.35	\$17.50	\$5.28	\$26.13	
lovember						
	Repair Trellis			21.12	21.12	
otal Nover	nber	\$0.00	\$0.00	\$21.12	\$21.12	
December		AA 4-	60.00	6 0.05	<u>60.05</u>	
otal Decer	nper	\$0.00	\$0.00	\$0.00	\$0.00	
aniual Aum	Real Estate Taxes		0.00		0.00	
	Management Fee		0.00		0.00	
	Net Land Rent		0.00		0.00	
	Miscellaneous		40.00		40.00	
	Overhead (Utilities, legal fees, etc)		30.00		30.00	
	Interest on Accumulating Investment		0.00		0.00	
otal Annua	al Administrative Costs		\$70.00		\$70.00	
Seasonal Co	osts					
	1/2 Ton Pick-up	32.96		50.69	83.64	
	Operating Capital	e	0.00	A	0.00	
otal Seaso	onal Costs	\$32.96	\$0.00	\$50.69	\$83.64	
		\$754.22	\$400.17	\$570.07	\$1 700 07	
	ND TEAK COSTS	\$154.32	φ 4 02.17	\$312.31	φ1,720.07	

Notes:

Estimated Production Costs per Acre for Muscadine Grapes Grown for the Wine and Juice Markest, Single Wire Trellis System without Irrigation Fourth through Twentieth Years (yield = 6.4 tons per acre)

		Equipment	Materials	Labor	Total	Your
Month	Type of Operation	Costs	Costs	Costs	Costs	Costs
January						
	Dormant mechanical pruning	255.00			255.00	
	Dormant pruning (10min/vine)	0.00		380.16	380.16	
Total Janua	ry	\$255.00	\$0.00	\$380.16	\$635.16	
February						
Total Febru	ary	\$0.00	\$0.00	\$0.00	\$0.00	
March						
	Fertilize	2.09		3.17	5.26	
	10-10-10		39.24		39.24	
	Apply Herbicide	3.42		5.28	8.70	
	flumioxazin (Chateau)	+glyphosate	55.88		55.88	
Total March	I	\$5.52	\$95.12	\$8.45	\$109.08	
April						
	Mow alleys (1) (30' min/acre)	5.59		6.34	11.93	
Total April		\$5.59	\$0.00	\$6.34	\$11.93	
Мау						
	Fertilize	2.09		3.17	5.26	
	10-10-10		26.16		26.16	
	Apply Insecticide (Prebloom)	5.72		5.28	11.00	
	carbaryl (Sevin 80 WP	')	6.30		6.30	
	Apply Fungicide	11.43		10.57	22.00	
	myclobutanil (Nova 40	W) 2X	32.00		32.00	
	Spray boron (Solubor 20% B)	5.72	0.70	5.28	11.70	
	Mow alleys	5.59		6.34	11.93	
Total May		\$30.55	\$65.16	\$30.64	\$126.35	
June						
	Leaf Analysis		4.00	2.64	6.64	
	Apply Herbicide	3.42		5.28	8.70	
	flumioxazin + glufosina	ate (Rely)	111.50		111.50	
	Apply Insecticide	5.72		5.28	11.00	
	carbaryl (Sevin 80 WP	')	7.88		7.88	
	Apply Fungicide	5.72		5.28	11.00	
	azoxystrobin (Abound	2.08 SC)	19.79		19.79	
	Apply Fungicide	5.72		5.28	11.00	
	captan+thiophanateme	ethyl (Topsin)	42.10		42.10	
	Mow alleys (2X)	11.19		12.67	23.86	
Total June		\$31.76	\$185.26	\$36.44	\$253.47	
July						
	Apply Fungicide	5.72		5.28	11.00	
	captan (Captan 50 WF	P)	13.60		13.60	
	Apply Fungicide	5.72		5.28	11.00	
	azoxystrobin (Abound	2.08 SC)	19.79		19.79	
	Apply Insecticide	3.42		5.28	8.70	
	chlorpyrifos (Lorsban 4	4E)	9.00		9.00	
	Mow alleys (2X)	11.19		12.67	23.86	

Total July		\$26.04	\$42.39	\$28.52	\$96.95	
August						
	Attend Grower Meetings		5.00	8.45	13.45	
	Apply Herbicide	3.42		5.28	8.70	
	sethoxydim (Poast 1.5 EC)		17.06		17.06	
	Mechanical prunning (summer)	127.50			127.50	
	Mow alleys (1) (30' min/acre)	5.59		6.34	11.93	
Total Augus	st	\$136.52	\$22.06	\$20.06	\$178.65	
September						
	Custom harvesting ¹	647.81		2.64	650.45	
Total Septe	mber	\$647.81	\$0.00	\$2.64	\$650.45	
October						
	Apply Herbicide (spot spray)	3.35		5.28	8.63	
	glyphosate		17.50		17.50	
Total Octob	ber	\$3.35	\$17.50	\$5.28	\$26.13	
November						
	Repair Trellis			21.12	21.12	
Total Nove	nber	\$0.00	\$0.00	\$21.12	\$21.12	
December						
Total Decer	nber	\$0.00	\$0.00	\$0.00	\$0.00	
Annual Adm	inistrative Costs					
	Real Estate Taxes		0.00		0.00	
	Management Fee		0.00		0.00	
	Net Land Rent		0.00		0.00	
	Miscellaneous		40.00		40.00	
	Overhead (Utilities, legal fees, etc)		30.00		30.00	
	Interest on Accumulating Investment		0.00		0.00	
Total Annua	al Administrative Costs		\$70.00		\$70.00	
Seasonal Co	osts					
	1/2 Ton Pick-up	32.96		50.69	83.64	
	Operating Capital		0.00		0.00	
Total Seaso	onal Costs	\$32.96	\$0.00	\$50.69	\$83.64	
TOTAL AN	NUAL COSTS	\$1,175.09	\$497.49	\$590.34	\$2,262.93	

Notes:

Estimated Monthly and Annual Production Costs per Acre for Muscadine Grapes Grown for the Wine and Juice Markets Single Wire Trellis System without Irrigation

	Equipment	Material	Labor	Total	Your
Year & Month	Costs	Costs	Costs	Costs	Costs
Site Preparation					
January	0.00	0.00	0.00	0.00	
February	0.00	0.00	0.00	0.00	
March	0.00	0.00	0.00	0.00	
May	0.00	0.00	0.00	0.00	
June	0.00	0.00	0.00	0.00	
July	0.00	0.00	0.00	0.00	
August	3.43	22.50	13.73	39.65	
September	0.00	0.00	0.00	0.00	
October	0.00	0.00	0.00	0.00	
November	23.48	746.90	32.42	802.80	
December	0.00	1,817.60	10.56	1,828.16	
Seasonal Charges	16.48	35.00	25.34	41.82	
Total Site Preparation	\$43.38	\$2,622.00	\$82.05	\$2,747.43	
First Mana					
First Year	0.00	0.00	0.00	0.00	
February	0.00	0.00	0.00	0.00	
March	184 56	0.00	672 41	856.97	
April	0.00	0.00	87.65	87.65	
May	13.14	213.81	374.88	601.83	
June	18.73	57.24	176.35	252.33	
July	18.73	15.54	176.35	210.63	
August	9.02	22.06	20.06	51.15	
September	0.00	0.00	21.12	21.12	
October	3.35	17.50	5.28	26.13	
November	0.00	0.00	0.00	0.00	
Appual Charges	0.00	0.00	0.00	0.00	
Seasonal Charges	32.06	0.00	50 60	83.64	
Total First Year	\$280.49	\$396.15	\$1,584.79	\$2,261.44	
Second Year (Yield = 0.8 tons/	A)	0.00	290.16	290.16	
January	0.00	0.00	380.16	380.16	<u> </u>
March	7 54	68 96	11.62	88.11	
April	5.59	0.00	6.34	11.93	
Mav	9.71	13.08	316.80	339.59	
June	14.61	115.50	20.59	150.71	
July	18.73	20.82	24.29	63.84	
August	11.07	22.06	23.23	56.37	
September	87.81	0.00	2.64	90.45	
October	3.35	17.50	5.28	26.13	
November	0.00	0.00	21.12	21.12	
Appuel Charges	0.00	70.00	0.00	70.00	
Seasonal Charges	32.96	0.00	50.69	83.64	
Total Second Year	\$191.39	\$327.92	\$862.75	\$1,382.06	
Third $\mathcal{M}_{2} = \mathcal{M}_{2} \mathcal{M}_{2}$					
lanuary	255.00	0.00	380 16	635 16	
February	0.00	0.00	0.00	0.00	
March	5.52	75.50	8.45	89.46	
April	5.59	0.00	6.34	11.93	
Мау	19.12	37.92	20.07	77.11	
June	26.04	136.98	31.16	194.18	
July	22.42	42.22	26.40	91.05	
August	136.52	22.06	20.06	178.65	
September	247.81	0.00	2.64	250.45	
November	0.00 0.00	0.00	0.∠0 21.12	20.13	
December	0.00	0.00	21.12 0.00	0.00	
Annual Charges	0.00	70.00	0.00	70.00	
Seasonal Charges	32.96	0.00	50.69	83.64	
Total Third Year	\$754.32	\$402.17	\$572.37	\$1,728.87	
Fourth Vear through Twopfieth	Voar (Viold -	6.4 tops (A)			
January	255.00	0.4 IONS /A) 0.00	380.16	635.16	
February	0.00	0.00	0.00	0.00	
March	5.52	95.12	8.45	109.08	
April	5.59	0.00	6.34	11.93	
May	30.55	65.16	30.64	126.35	
June	31.76	185.26	36.44	253.47	
July	26.04	42.39	28.52	96.95	
August	136.52	22.06	20.06	1/8.65	
September October	047.81 2.25	17 50	2.64	050.45	
November	3.35	0.00	5.28 21 12	20.13	
December	0.00	0.00	0.00	0.00	
Annual Charges	0.00	70.00	0.00	70.00	
Seasonal Charges	32.96	0.00	50.69	83.64	
Total Annual Costs	\$1,175.09	\$497.49	\$590.34	\$2,262.93	

Monthly Labor Estimates per Acre for Muscadine Grapes Grown for the Wine and Juice Markets Single Wire Trellis System without Irrigation

Year & Month	Labor	Estimat
(Person Hours)	
Site Droparation		
Sile Preparation	0.000	
February	0.000	
March	0.000	
April	0.000	
Mav	0.000	
June	0.000	
July	0.000	
August	1.300	
September	0.000	
October	0.000	
November	3.070	
December	1.000	
Seasonal Charges	2.400	
Total Site Preparation	7.770	
Eirst Voor		
	0.000	
January	0.000	
March	75.400	
Anril	x 3.400	
May	0.300 25 500	
lune	16 700	
July	16 700	
August	1 000	
Soptombor	2 000	
Ostabar	2.000	
Nevember	0.500	
December	0.500	
Second Charges	4 800	
Total First Year	4.600	
Total First fear	102.000	
Second Year		
January	36.000	
February	0.000	
March	1,100	
April	0.600	
Mav	30,000	
June	1.950	
July	2.300	
August	2.200	
September	0.250	
October	0.500	
November	2.000	
December	0.000	
Seasonal Charges	4.800	
Total Second Year	81.700	
Third Year		
January	36.000	
repruary	0.000	
March April	0.800	
April	0.600	
iviay	1.901	
June	2.951	
July	2.500	
August	1.900	
September	0.250	
UcioDer	0.500	
November	2.000	
December	0.000	
Seasonal Unarges	4.800	
i otar i i i i u i edi	04.202	
Fourth Year through Twentieth	/ear	
January	36.000	
February	0.000	
March	0.800	
April	0.600	
May	2.902	
June	3.451	
July	2.701	
August	1.900	
September	0.250	
October	0.500	
Nevember	4.000	
NOVEITIDEI	4.000	
December	0 000	
December Annual Charges	0.000	
December Annual Charges Seasonal Charges	0.000 0.000 4 800	
December Annual Charges Seasonal Charges	0.000 0.000 4.800 57.904	

		Total	Total	Net Cash		Discount	Present
	Yield	Costs	Revenue	Flow	Accumulated	Factor	Value of Net
Year	per Acre	per Acre	per Acre	per Acre	Cash Flow	6%	Cash Flow
0	0	3,839.13	0.00	(3,839.13)	(3,839.13)	1.00	(3,839.13)
1	0	2,832.88	0.00	(2,832.88)	(6,672.01)	0.94	(2,672.52)
2	0.8	1,382.06	400.00	(982.06)	(7,654.07)	0.89	(874.03)
3	2.4	1,728.87	1,200.00	(528.87)	(8,182.94)	0.84	(444.05)
4	6.4	2,262.93	3,200.00	937.07	(7,245.87)	0.79	742.25
5	6.4	2,262.93	3,200.00	937.07	(6,308.79)	0.75	700.24
6	6.4	2,262.93	3,200.00	937.07	(5,371.72)	0.70	660.60
7	6.4	2,262.93	3,200.00	937.07	(4,434.64)	0.67	623.21
8	6.4	2,262.93	3,200.00	937.07	(3,497.57)	0.63	587.93
9	6.4	2,262.93	3,200.00	937.07	(2,560.49)	0.59	554.65
10	6.4	2,667.93	3,200.00	532.07	(2,028.42)	0.56	297.11
11	6.4	2,262.93	3,200.00	937.07	(1,091.34)	0.53	493.64
12	6.4	2,617.89	3,200.00	582.11	(509.23)	0.50	289.29
13	6.4	2,262.93	3,200.00	937.07	427.84	0.47	439.34
14	6.4	2,262.93	3,200.00	937.07	1,364.92	0.44	414.47
15	6.4	2,336.01	3,200.00	863.99	2,228.91	0.42	360.51
16	6.4	2,262.93	3,200.00	937.07	3,165.99	0.39	368.88
17	6.4	2,262.93	3,200.00	937.07	4,103.06	0.37	348.00
18	6.4	2,262.93	3,200.00	937.07	5,040.14	0.35	328.30
19	6.4	2,262.93	3,200.00	937.07	5,977.21	0.33	309.72
20	6.4	1,767.37	3,200.00	1,432.63	7,409.84	0.31	446.70
	Total						\$135.09

Breakeven and Net Present Value Analysis for Muscadine Grapes Grown for the Wine and Juice Markets, Single WireTrellis System without Irrigation

Breakeven Year	13th Year
Total Accumulated Cah Flow	\$7,409.84
Net Present Value	\$135.09
Internal Rate of Return	6.20%

Wholesale Price		Marketable Yield per Acre							
			(Tons)			(Tons)			
(\$/Ton)	5.76	6.08	6.4	6.72	7.04				
400	(785.18)	(689.18)	(593.18)	(497.18)	(401.18)	8.38			
450	(497.18)	(385.18)	(273.18)	(161.18)	(49.18)	7.09			
500	(209.18)	(81.18)	46.82	174.82	302.82	6.28			
550	78.82	222.82	366.82	510.82	654.82	5.58			
600	366.82	526.82	686.82	846.82	1,006.82	5.03			

Estimated Returns to Land & Management per Acre for varying Prices and Yields for Muscadine Grapes Grown for the Wine and Juice Markets Single Wire Trellis System without Irrigation

Estimated Production Costs, Gross Revenues, and Returns per Acre for Muscadines Grapes Grown for the Wine and Juice Markets Geneva Double Curtain Trellis System with no Irrigation

Revised: August 2006

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This budget presents the estimated costs of producing and harvesting muscadine grapes for the wine and juice markets in North Carolina, an investment analysis of muscadine grape production, and the effects of varying wholesale prices and yields on returns to land and management. The budget was developed for a representative 10 acre grape vineyard assuming a Geneva Double Curtain (GDC) trellis and without an irrigation system. It was also assumed that the management of the vineyard would be near optimal and that all recommended practices would be followed. This information can be useful for farmers considering starting a new muscadine grape vineyard or expanding an existing operation. Mention of a product or vendor does not constitute a guarantee or warranty of the product, nor does it imply recommendation of one product over another. Other products may also be suitable depending on soils, weather conditions, farm history, and pest pressures.

Budget Contents

Monthly and annual cost estimates by operation

- Site Preparation
- Year 1: Planting Year

- Year2: First Harvest Year

- Year 3: Second Harvest Year

- Years 4 through 20: Full Production

Trellis Construction Costs

Monthly Cost Summary

Monthly Labor Requirement Summary Investment Analysis

Estimated Costs and Returns for Varying Yields and Wholesale Prices

Estimated Production Costs per Acre for Muscadine Grapes Grown for the Wine and Juice Markets, Geneva Double Curtain Trellis System without Irrigation Site Preparation

		Equipment	Materials	Labor	Total	Your
Month	Type of Operation	Costs	Costs	Costs	Costs	Costs
August						
nuguot	Attend Grower Meetings		5.00	8.45	13.45	
	Apply Herbicide	3.43		5.28	8.71	
	glyphosate		17.50		17.50	
Total Aug	qust	\$3.43	\$22.50	\$13.73	\$39.65	
Novembe	r					
	Plow Field	12.31		13.94	26.25	
	Disc Field	5.31		6.97	12.28	
	Order & Plant cover crop	2.93	50.00	4.44	57.36	
	Custom Applied Nutrients	2.93		4.44	7.36	
	Lime		77.00		77.00	
	Triple Superphosphate		20.40		20.40	
	Order plants		500.50	2.64	503.14	
Total Nov	vember	23.48	647.90	32.42	703.80	
Decembe	r					
	Order trellis supplies*		3,092.48	10.56	3,103.04	
Total Dec	cember	0.00	3,092.48	10.56	3,103.04	
Annual Ad	dministrative Costs					
	Real Estate Taxes		0.00		0.00	
	Management Fee		0.00		0.00	
	Net Land Rent		0.00		0.00	
	Miscellaneous		20.00		20.00	
	Overhead (Utilities, legal fees, etc)		15.00		15.00	
Total Ann	nual Administrative Costs	0.00	35.00	0.00	35.00	
Seasonal	Costs					
	1/2 Ton Pick-up	16.48		25.34	41.82	
	Operating Capital		0.00		0.00	
Total Sea	asonal Costs	16.48	0.00	25.34	41.82	
TOTAL P	REPARATION COSTS	43.38	3,797.88	82.05	3,923.31	

Estimated Materials Costs for a Genevia Double Curtain Trellis for a 10-Acre Vineyard

	Rate/		Cost per	Total	Your
Trellis Materials	Acre	Unit	Unit	Cost	Cost
Treated 4" x 8' Posts	1820	ea	5.00	9,100.00	
Treated 6" x 8' Posts (end brace posts)	220	ea	7.00	1,540.00	
Treated 6" x 6 1/2' Posts (inside brace posts)	220	ea	9.40	2,068.00	
Treated 4" x 4" x 6' Timbers	220	ea	5.00	1,100.00	
Wire, 100-pound rolls of # 9 galvanized	45	roll	74.00	3,330.00	
Metalic crossarms	1820	ea	6.50	11,830.00	
Spreader 2"x4"x45"	220	ea	2.00	440.00	
3/8 x 8" galvanized bolt	1820	ea	0.80	1,456.00	
3/16" bolts	220	ea	0.24	52.80	
Staples	10	lb	0.80	8.00	
Total Trellis Materials Cost				\$30,924,80	

Estimated Construction Costs for a Genevia Double Trellis for a 10-Acre Vineyard

	Equipment	Materials	Labor		Total	Your
Operation	Costs	Costs	Hours	Costs	Costs	Costs
Materials Cost		30 924 80			30 924 80	
Mark rows and post locations		30,324.00	40	330.00	330.00	
Distribute posts	297.84		35	288.75	586.59	
Drive line posts (2 workers @ 3min/post)	900.86		180	1,485.00	2,385.86	
Auger and set end posts (2 workers @ 5 min/post)	301.89		73	602.25	904.14	
Construct Trellis			500	4,125.00	4,125.00	
Total Costs	\$1,500.59	\$30,924.80	828	\$6,831.00	\$39,256.39	

Estimated Production Costs per Acre for Muscadine Grapes Grown for the Wine and Juice Markets, Geneva Double Curtain Trellis System without Irrigation First Year: Planting and Trellis Construction

	T (0 ()	Equipment	Materials	Labor	Total	Your
Month	Type of Operation	Costs	Costs	Costs	Costs	Costs
January						
Total Janua	ary	\$0.00	\$0.00	\$0.00	\$0.00	
Total Febru	larv	\$0.00	\$0.00	\$0.00	\$0.00	
March		\$0.00	\$0.00	\$0.00		
	Build Trellis	150.06		683.10	833.16	
	Auger vine holes ¹	8.40		230.63	239.03	
Total Marcl	1	\$158.46	\$0.00	\$913.73	\$1.072.19	
April	Order Prunning Equipment	¢100.10	\$0.00	<i>Q</i> 010110	¢1,012.10	
	Plant vines (2 min/vine)			10.56	10.56	
Total April		\$0.00	\$0.00	\$73.92	\$73.92	
May	Order & Replant ²		24.75	10.56	35.31	
	Growth tube installation		116.48	36.96	153.44	
	Fertilize	4.12		6.34	10.46	
	10-10-10 Apply Herbicide	3 / 2	6.54	5.28	6.54 8.70	
	flumioxazin (Chateau)	5.42	37.50	5.20	37.50	
	Train/Prune (16 min/vine)	0.00		506.88	506.88	
	Mow alleys	5.59		6.34	11.93	
Total May		\$13.14	\$185.27	\$572.35	\$770.76	
June	Apply Herbicide	3.42		5.28	8 70	
	flumioxazin + paraquat	0.42	50.70	0.20	50.70	
	Fertilize	4.12		6.34	10.46	
	10-10-10		6.54		6.54	
	Train/Prune (8 min/vine)	0.00		253.44	253.44	
Total June	Mow alleys (2X)	\$18.73	\$57.24	\$277.73	\$353.70	
July				+=		
	Fertilize	4.12		6.34	10.46	
	10-10-10	0.40	6.54	5.00	6.54	
	Apply Insecticide	3.42	0.00	5.28	8.70	
	Train/Prune (8 min/vine)	0.00	3.00	253.44	253.44	
	Mow alleys (2X)	11.19		12.67	23.86	
Total July		\$18.73	\$15.54	\$277.73	\$312.00	
August	Attack Common Manafiana		5.00	0.45	40.45	
	Anend Grower Meetings Apply Herbicide	3 42	5.00	6.45 5.28	8 70	
	sethoxydim (Poast 1.5 EC	2)	17.06		17.06	
	Mow alleys	5.59		6.34	11.93	
Total Augu	st	\$9.02	\$22.06	\$20.06	\$51.15	
September	Growth tube removal			18.48	18.48	
Total Septe	mber	\$0.00	\$0.00	\$18.48	\$18.48	
October - D	ecember					
	Apply Herbicide (spot spray)	3.35		5.28	8.63	
Tetel Ostel	glyphosate	60.05	17.50	¢5.00	17.50	
Annual Adm	inistrative Costs	\$3.3D	\$17.5U	\$0.∠o	\$20.13	
, unidar , tan	Real Estate Taxes		0.00		0.00	
	Management Fee		0.00		0.00	
	Net Land Rent		0.00		0.00	
	Miscellaneous Overhead (I Itilities, legal fees, etc.)		40.00		40.00	
	Interest on Accumulating Investment		0.00		0.00	
Total Annu	al Administrative Costs		\$70.00		\$70.00	
Seasonal C	osts					
	1/2 Ton Pick-up	32.96	0.00	50.69	83.64	
Total Seaso	onal Costs	\$32.96	\$0.00	\$50,69	\$83.64	
0000		JO2.00		÷00.00	÷ 50.04	
TOTAL YEA	AR 1 PLANTING COSTS	\$254.38	\$367.61	\$2,209.97	\$2,831.97	

Notes:

¹Auger vine holes: 2 workers @ 3 min/vine ²Order & Replant 5% of the initial plants

Estimated Production Costs per Acre for Muscadine Grapes Grown for the Wine and Juice Markets, Geneva Double Curtain Trellis System without Irrigation Second Year: First Harvest (yield = 1.0 ton per acre)

Month	Type of Operation	Equipment Costs	Materials Costs	Labor Costs	Total Costs	Your Costs
January	Dormant Pruning (20 min/vine)	0.00		633.60	633.60	
Total Janua	iry	\$0.00	\$0.00	\$633.60	\$633.60	
February	-					
Total Febru	ary	\$0.00	\$0.00	\$0.00	\$0.00	
March	F = #11	4.40		C 24	40.40	
	10-10-10	4.12	13.08	6.34	10.46	
	Apply Herbicide	3.42	10.00	5.28	8.70	
	flumioxazin (Chateau)+g	lyphosate	55.88		55.88	
Total March	1	\$ 7.54	\$ 68.96	\$ 11.62	\$ 88.11	
April						
Tetel Aunil	Mow alleys	5.59	0.00	6.34	11.93	
May		\$0.09	\$0.00	\$0.34	\$11.93	
way	Fertilize	4.12		6.34	10.46	
	10-10-10		13.08		13.08	
	Train/Prune (16 min/vine)	0.00		506.88	506.88	
	Mow alleys	5.59		6.34	11.93	
Total May		\$9.71	\$13.08	\$519.55	\$542.35	
June	Loof Applysis		4.00	2.64	6.64	
	Apply Herbicide	3.42	4.00	5.28	8.70	
	flumioxazin + glufosinate	(Rely)	111.50		111.50	
	Mow alleys (2X)	11.19		12.67	23.86	
Total June		\$14.61	\$115.50	\$20.59	\$150.71	
July						
	Fertilize	4.12	12.09	6.34	10.46	
	Apply Insecticide	3 4 2	13.00	5 28	8 70	
	chlorpyrifos (Lorsban 4E)	7.74	0.20	7.74	
	Mow alleys (2X)	, 11.19		12.67	23.86	
Total July		\$18.73	\$20.82	\$24.29	\$63.84	
August						
	Attend Grower Meetings	2.42	5.00	8.45	13.45	
	Apply Herbicide	3.42	17.06	5.28	8.70 17.06	
	Mow allevs	5.59	17.00	6.34	11.93	
Total Augus	st	\$9.02	\$22.06	\$20.06	\$51.15	
September						
	Custom Harvest ¹	111.81		2.64	114.45	
Total Septe	mber	\$111.81	\$0.00	\$2.64	\$114.45	
October	Apply Herbicide (spot spray)	3 35		5 28	8.63	
	dvphosate	0.00	17.50	0.20	17.50	
Total Octob	er	\$3.35	\$17.50	\$5.28	\$26.13	
November						
	Repair Trellis		• • • • •	31.68	31.68	
Total Nover	nber	\$0.00	\$0.00	\$31.68	\$31.68	
Total Decer	nhor	\$0.00	00 02	\$0.00	\$0.00	
Annual Adm	inistrative Costs	φ0.00	ψ0.00	ψ0.00	φ0.00	
	Real Estate Taxes		0.00		0.00	
	Management Fee		0.00		0.00	
	Net Land Rent		0.00		0.00	
	Miscellaneous		40.00		40.00	
	Overhead (Utilities, legal fees, etc.)		30.00		30.00	
Total Anore	Interest on Accumulating Investment	\$0.00	0.00		0.00	
Seasonal Co	ar Auministrative COSTS	\$0.00	\$70.00		\$70.00	
Coasonal O	1/2 Ton Pick-up	32.96		50.69	83.64	
	Operating Capital	02.00	0.00	00.00	0.00	
Total Seaso	onal Costs	\$32.96	\$0.00	\$50.69	\$83.64	
TOTAL SEC	COND YEAR COSTS	\$213.33	\$327.92	\$1,326.34	\$1,867.59	

Notes:

¹Custom Harvest: Farmers provides a 60 HP tractor.

Estimated Production Costs per Acre for Muscadine Grapes Grown for the Wine and Juice Markets, Geneva Double Curtain Trellis System without Irrigation Third Year: Second Harvest (yield = 3.1 tons per acre)

Month	Type of Operation	Equipment Costs	Materials Costs	Labor Costs	Total Costs	Your Costs
lanuary	· · ·					
January	Dormant mechanical pruning	255.00			255.00	
	Dormant pruning (20min/vine)	0.00		633.60	633.60	
Total Janua	ary	\$255.00	\$0.00	\$633.60	\$888.60	
ebruary						
Fotal Febru	lary	\$0.00	\$0.00	\$0.00	\$0.00	
viarcn	Fertilize	2.09		3.17	5.26	
	10-10-10		19.62		19.62	
	Apply Herbicide	3.42		5.28	8.70	
	flumioxazin (Chateau) +gly	phosate	55.88		55.88	
otal March	1	\$5.52	\$75.50	\$8.45	\$89.46	
April	Mow alleys	5 59		6 34	11 93	
otal April	Now alleys	\$5.59	\$0.00	\$6.34	\$11.93	
Лау				••••	· · · · -	
	Fertilize	2.09		3.17	5.26	
	10-10-10		19.62		19.62	
	Apply Insecticide (Prebloom)	5.72		5.28	11.00	
	carbaryl (Sevin 80 WP)	5 70	6.30	5 22	6.30	
	myclobutanil (Nova 40 W)	5.72	12 00	5.20	12.00	
	Mow alleys	5.59	12.00	6.34	11.93	
otal May		\$19.12	\$37.92	\$20.07	\$77.11	
une						
	Leaf Analysis		4.00	2.64	6.64	
	Apply Herbicide	3.42 Rohu)	111 50	5.28	8.70	
	Apply Insecticide	Kely) 5.72	111.50	5 28	11.50	
	carbarvl (Sevin 80 WP)	0.72	7.88	0.20	5.88	
	Apply Fungicide	5.72		5.28	11.00	
	captan (Captan 50 WP)		13.60		13.60	
	Mow alleys (2X)	11.19		12.67	23.86	
otal June		\$26.04	\$136.98	\$31.16	\$194.18	
uly		2.00		0.47	5.00	
	10 10 10	2.09	10.62	3.17	5.20 19.62	
	Apply Insecticide	3.42	13.02	5.28	11.00	
	chlorpyrifos (Lorsban 4E)		9.00		9.00	
	Apply Fungicide	5.72		5.28	11.00	
	captan (Captan 50 WP)		13.60		13.60	
	Mow alleys (2X)	11.19	A 10 00	12.67	23.86	
otal July		\$22.42	\$42.22	\$26.40	\$91.05	
lugusi	Attend Grower Meetings		5.00	8 4 5	13 45	
	Apply Herbicide	3.42	0.00	5.28	8.70	
	sethoxydim (Poast 1.5 EC)	17.06		17.06	
	Mechanical prunning (summer)	127.50			127.50	
	Mow alleys	5.59		6.34	11.93	
otal Augus	st	\$136.52	\$22.06	\$20.06	\$178.65	
eptember		040.04		0.04	000.45	
otal Sonto	Custom Harvest	\$319.81	<u>00 02</u>	2.64 \$2.64	\$322.45	
otal Septe	in straight in the straight in	ψ319.01	φ0.00	φ2.04	ψJZZ.40	
	Apply Herbicide (spot spray)	3.35		5.28	8.63	
	glyphosate		17.50		17.50	
otal Octob	ber	\$3.35	\$17.50	\$5.28	\$26.13	
lovember						
	Repair Trellis			21.12	21.12	
	liber	\$0.00	\$0.00	\$21.12	\$21.12	
otal Decer	mber	\$0.00	\$0.00	\$0.00	\$0.00	
nnual Adm	inistrative Costs					
	Real Estate Taxes		0.00		0.00	
	Management Fee		0.00		0.00	
	Net Land Rent		0.00		0.00	
	Miscellaneous		40.00		40.00	
	Overhead (Utilities, legal fees, etc.)		30.00		30.00	
otal Ann	Interest on Accumulating Investment		0.00		0.00	
easonal Cr	osts		φ/0.00		\$70.00	
	1/2 Ton Pick-up	32.96		50.69	83.64	
	Operating Capital		0.00		0.00	
otal Seaso	onal Costs	\$32.96	\$0.00	\$50.69	\$83.64	
OTAL THI	RD YEAR COSTS	\$826.32	\$402.17	\$825.81	\$2,054.31	

Notes:

¹Custom Harvest: Farmers provides a 60 HP tractor.

Estimated Production Costs per Acre for Muscadine Grapes Grown for the Wine and Juice Markets, Geneva Double Curtain Trellis System without Irrigation Fourth through Twentieth Years (yield = 8.3 tons per acre)

Month	Type of Operation	Equipment Costs	Materials Costs	Labor Costs	Total Costs	Your Costs
January	Dormant mechanical pruning	255.00			255.00	
	Dormant pruning (20min/vine)	0.00		633.60	633.60	
Total Janua	ary	\$255.00	\$0.00	\$633.60	\$888.60	
February		6 0.00	*• • • •	AO OO	*• • • •	
Total Febru March	lary	\$0.00	\$0.00	\$0.00	\$0.00	
March	Set up irrigation system	0.00		0.00	0.00	
	Fertilize	2.09		3.17	5.26	
	10-10-10		39.24		39.24	
	Apply Herbicide	3.42	55.88	5.28	8.70	
Total Marcl	numioxaziri (Criateau) +gi	\$5.52	\$95.12	\$8.45	\$109.08	
April	-					
	Mow alleys	5.59		4.95	10.54	
Total April		\$5.59	\$0.00	\$4.95	\$10.54	
way	Fertilize	2.09		3.17	5.26	
	10-10-10		26.16		26.16	
	Apply Insecticide (Prebloom)	5.72		5.28	11.00	
	carbaryl (Sevin 80 WP)		6.30		6.30	
	Apply Fungicide	11.43	22.00	10.57	22.00	
	Spray Solubor (20% B)	5.72	32.00 0.70	5.28	32.00 11.70	
	Mow alleys	5.59	0.10	4.95	10.54	
Total May		\$30.55	\$65.16	\$29.25	\$124.96	
June						
	Leaf Analysis Apply Herbicide	3 4 2	4.00	2.64	6.64 8.70	
	flumioxazin + glufosinate	(Relv)	111.50	5.20	111.50	
	Apply Insecticide	5.72		5.28	11.00	
	carbaryl (Sevin 80 WP)		7.88		7.88	
	Apply Fungicide	5.72	10 70	5.28	11.00	
	azoxystrobin (Abound 2.0	8 SC)	19.79	E 20	19.79	
	captan+thiophanatemethy	(Topsin)	42.10	5.20	42.10	
	Mow alleys (2X)	11.19		9.90	21.09	
Total June		\$31.76	\$185.26	\$33.67	\$250.70	
July		5 70		5.00	44.00	
	Apply Fungicide	5.72	13.60	5.28	11.00	
	Apply Fungicide	5.72	13.00	5.28	11.00	
	azoxystrobin (Abound 2.0	8 SC)	19.79		19.79	
	Apply Insecticide	3.42		5.28	8.70	
	chlorpyrifos (Lorsban 4E)	44.40	9.00	0.00	9.00	
Total July	Now alleys (2X)	\$26.04	\$42.39	\$25.75	\$94.18	
August		ψ20.04	φ+2.00	ψ20.10	\$34.10 <u></u>	
	Attend Grower Meetings		5.00	8.45	13.45	
	Apply Herbicide	3.42		5.28	8.70	
	sethoxydim (Poast 1.5 EC	;)	17.06		17.06	
	Mow alleys	127.50		4 95	127.50	
Total Augu	st	\$136.52	\$22.06	\$18.68	\$177.26	
September						
	Custom Harvest ¹	839.81		2.64	842.45	
Total Septe	mber	\$839.81	\$0.00	\$2.64	\$842.45	
October	Apply Herbicide (spot spray)	3.35		5.28	8.63	
	glyphosate		17.50		17.50	
Total Octob	ber	\$3.35	\$17.50	\$5.28	\$26.13	
November	D · T #			10.01	10.01	
Total Nove	Repair Trellis	\$0.00	\$0.00	42.24 \$42.24	\$42.24	
December		ψ0.00	ψ0.00	Ψ 1 2.24	φ+2.24	
Total Dece	nber	\$0.00	\$0.00	\$0.00	\$0.00	
Annual Adm	inistrative Costs					
	Real Estate Taxes		0.00		0.00	
	Net Land Rent		0.00		0.00	
	Miscellaneous		40.00		40.00	
	Overhead (Utilities, legal fees, etc.)		30.00		30.00	
	Interest on Accumulating Investment		0.00		0.00	
Seasonal C	al Administrative Costs		\$70.00		\$70.00	
JeasUlidi U	1/2 Ton Pick-up	32.96		50.69	83.64	
	Operating Capital		0.00	20.00	0.00	
Total Sease	onal Costs	\$32.96	\$0.00	\$50.69	\$83.64	
		A . A	• <i>u</i> = · · ·	00577		
TOTAL AN	NUAL COSTS	\$1,367.09	\$497.49	\$855.20	\$2,719.78	

Notes:

¹Custom Harvest: Farmers provides a 60 HP tractor.

Estimated Monthly	and Annual Proc	duction Costs	per Acre for	Muscadine G	Fapes
	Grown for the	Wine and Jui	ce Markets		
Geneva	a Double Curtain	Trellis Syste	m without Irri	gation	
		-		-	
	Equipment	Material	Labor	Total	Your

Month & Year	Costs	Costs	Costs	Costs
Site Preparation				
January	0.00	0.00	0.00	0.00
February	0.00	0.00	0.00	0.00
March	0.00	0.00	0.00	0.00
April	0.00	0.00	0.00	0.0
April	0.00	0.00	0.00	0.00
May	0.00	0.00	0.00	0.00
June	0.00	0.00	0.00	0.00
July	0.00	0.00	0.00	0.00
August	3.43	22.50	13.73	39.65
September	0.00	0.00	0.00	0.00
October	0.00	0.00	0.00	0.00
November	23.48	647.90	32.42	703.80
December	0.00	3,092.48	10.56	3,103.04
Annual Charges	0.00	35.00	0.00	35.00
Seasonal Charges	16.48	0.00	25.34	41.82
Total Site Prenaraion	\$43.38	\$3 797 88	\$82.05	\$3 923 31
rotal one ricparaton	\$10.00	\$0,707.00	002.00	\$0,020.01
First Year				
January	0.00	0.00	0.00	0.00
February	0.00	0.00	0.00	0.00
Moreh	169.46	0.00	012 72	1 072 10
April	108.46	0.00	313.73	1,072.15
April	0.00	0.00	73.92	73.92
May	13.14	185.27	572.35	770.76
June	18.73	57.24	277.73	353.70
July	18.73	15.54	277.73	312.00
August	9.02	22.06	20.06	51.15
September	0.00	0.00	18.48	18.48
October	3.35	17.50	5.28	26.13
November	0.00	0.00	0.00	0.00
December	0.00	0.00	0.00	0.00
Annual Ohan	0.00	0.00	0.00	U.UL
Annual Charges	0.00	70.00	0.00	70.00
Seasonal Charges	32.96	0.00	50.69	83.64
Total First Year	\$254.38	\$367.61	\$2,209.97	\$2,831.97
Second Year (Yield = 1 ton	/A)			
January	0.00	0.00	633.60	633.60
February	0.00	0.00	0.00	0.00
March	7.54	68.96	11.62	88.11
April	5.59	0.00	6.34	11.93
May	9.71	13.08	519.55	542.35
June	14.61	115.50	20.59	150.71
July	18.73	20.82	24.29	63.84
August	9.02	22.06	20.06	51 15
Sentember	111.81	0.00	2.64	114.45
Ostobor	2.25	17.50	£ 09	26.12
October	3.33	17.30	5.28	20.13
November	0.00	0.00	31.68	31.68
December	0.00	0.00	0.00	0.00
Annual Charges	0.00	70.00	0.00	70.00
Seasonal Charges	32.96	0.00	50.69	83.64
Total Second Year	\$213.33	\$327.92	\$1,326.34	\$1,867.59
Third Year Of the State				
i niru Year (Yield = 3.1 tons	(A)	A A-	000 0-	
January	255.00	0.00	633.60	888.60
February	0.00	0.00	0.00	0.00
March	5.52	75.50	8.45	89.46
April	5.59	0.00	6.34	11.93
May	19.12	37.92	20.07	77.11
June	26.04	136.98	31.16	194.18
Julv	22 42	42.22	26.40	91.05
August	136 52	22.06	20.06	178 65
Contombor	210.04	22.00	20.00	200.40
Ostaline	319.61	0.00	2.04	322.45
Ucioběř	3.35	17.50	5.28	26.13
November	0.00	0.00	21.12	21.12
December	0.00	0.00	0.00	0.00
Annual Charges	0.00	70.00	0.00	70.00
Seasonal Charges	32.96	0.00	50.69	83.64
Total Third Year	\$826.32	\$402.17	\$825.81	\$2,054.31
Fourth Year through Twent	ieth Year (Yield =	8.3 tons /A)		
January	255.00	0.00	633.60	888.60
February	0.00	0.00	0.00	0.00
March	5.52	95.12	8.45	109.08
April	5 59	0.00	4 95	10.54
May	30.55	65.16	29.25	124 96
lune	31 79	195.10	23.23	250.70
Julio	31.70	100.20	33.07	200.70
July	26.04	42.39	25.75	94.18
August	136.52	22.06	18.68	177.26
September	839.81	0.00	2.64	842.45
October	3.35	17.50	5.28	26.13
November	0.00	0.00	42.24	42.24
December	0.00	0.00	0.00	0.00
Annual Charges	0.00	70.00	0.00	70.00
0	32.06	0.00	50.69	83.64
Seasonal Charges	32.30		0	
Total Annual Cost	\$1,367.09	\$497,49	\$855,20	\$2,719.7

Monthly Labor Estimates per Acre for Muscadine Grapes Grown for the Wine and Juice Markets Geneva Double Curtain Trellis System without Irrigation

Month & Year	Labor	Estimate
	(Person Hours)	
Site Preparation		
January	0.000	
February	0.000	
March	0.000	
April	0.000	
May	0.000	
June	0.000	
July	0.000	
August	1.300	
September	0.000	
October	0.000	
November	3.070	
December	1.000	
Miscellaneous Labor	2.400	
i otal Site Preparation	1.110	
First Year		
January	0.000	
February	0.000	
March	104.640	
April	7.000	
May	54.200	
June	26.300	
July	26.300	
August	1.900	
September	1.750	
October	0.500	
November	0.500	
December	0.500	
Viscellaneous Labor	4.800	
otal First Year	228.390	
Second Year		
January	60.000	
February	0.000	
March	1.100	
April	0.600	
Иау	49.200	
lune	1.950	
July	2.300	
August	1.900	
September	0.250	
October	0.500	
November	3.000	
December	0.000	
Viscellaneous Labor	4.800	
Total Second Year	125.600	
Third Year		
January	60.000	
ebruary	0.000	
March	0.800	
April	0.600	
Лау	1.901	
June	2.951	
luly	2.500	
August	1.900	
September	0.250	
October	0.500	
November	3.000	
December	0.000	
Aiscellaneous Labor	4.800	
otal Third Year	79.202	
ourth Year		
January	60.000	
February	0.000	
March	0.800	
April	0.600	
Mav	2 902	
June	3 451	
July	2 701	
August	1 900	
September	0.250	
October	0.200	
November	4 000	
December	4.000	
	4 000	
Total Fourth Voc-	4.000	
i otali i oururi i edi	01.504	

Breakeven and Net Present Value Analysis for Muscadine Grapes Grown for the Wine and Juice Markets, Geneva Double Curtain Trellis System without Irrigation

		Total	Total	Net Cash		Discount	Present
	Yield	Costs	Revenue	Flow	Accumulated	Factor	Value of Net
Year	per Acre	per Acre	per Acre	per Acre	Cash Flow	6%	Cash Flow
0	0.0	5,015.01	0.00	(5,015.01)	(5,015.01)	1.00	(5,015.01)
1	0.0	3,403.41	0.00	(3,403.41)	(8,418.42)	0.94	(3,210.76)
2	1.0	1,867.59	520.00	(1,347.59)	(9,766.01)	0.89	(1,199.35)
3	3.1	2,054.31	1,560.00	(494.31)	(10,260.32)	0.84	(415.03)
4	8.3	2,719.78	4,160.00	1,440.22	(8,820.10)	0.79	1,140.79
5	8.3	2,719.78	4,160.00	1,440.22	(7,379.89)	0.75	1,076.21
6	8.3	2,719.78	4,160.00	1,440.22	(5,939.67)	0.70	1,015.30
7	8.3	2,719.78	4,160.00	1,440.22	(4,499.45)	0.67	957.83
8	8.3	2,719.78	4,160.00	1,440.22	(3,059.24)	0.63	903.61
9	8.3	2,719.78	4,160.00	1,440.22	(1,619.02)	0.59	852.46
10	8.3	3,124.78	4,160.00	1,035.22	(583.81)	0.56	578.06
11	8.3	2,719.78	4,160.00	1,440.22	856.41	0.53	758.69
12	8.3	3,074.74	4,160.00	1,085.26	1,941.67	0.50	539.34
13	8.3	2,719.78	4,160.00	1,440.22	3,381.88	0.47	675.23
14	8.3	2,719.78	4,160.00	1,440.22	4,822.10	0.44	637.01
15	8.3	2,792.86	4,160.00	1,367.14	6,189.24	0.42	570.46
16	8.3	2,719.78	4,160.00	1,440.22	7,629.45	0.39	566.94
17	8.3	2,719.78	4,160.00	1,440.22	9,069.67	0.37	534.85
18	8.3	2,719.78	4,160.00	1,440.22	10,509.89	0.35	504.57
19	8.3	2,719.78	4,160.00	1,440.22	11,950.10	0.33	476.01
20	8.3	2,224.23	4,160.00	1,935.77	13,885.87	0.31	603.58
	Total						\$2,550.76

Breakeven Year Total Accumulated Cah Flow Net Present Value Internal Rate of Return

11th Year \$13,885.87 \$2,550.76 8.50%

Estimated Returns to Land & Management per Acre for varying Prices and Yields for Muscadine Grapes Grown for the Wine and Juice Markets Geneva Double Curtain Trellis System without Irrigation

Wholesale Price		Breakeven Yield				
			(Tons)			
(\$/Ton)	7.49	7.9	8.32	8.74	9.15	(Ton)
300	(1,508.76)	(1,426.76)	(1,342.76)	(1,258.76)	(1,176.76)	15.03
400	(759.76)	(636.76)	(510.76)	(384.76)	(261.76)	10.02
500	(10.76)	153.24	321.24	489.24	653.24	7.52
550	363.74	548.24	737.24	926.24	1,110.74	6.68
600	738.24	943.24	1,153.24	1,363.24	1,568.24	6.01

Estimated Production Costs, Gross Revenues, and Returns per Acre for Muscadines Grapes Grown for the Wine and Juice Markets Single Wire Trellis System with Drip Irrigation

Revised: November 2006

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This budget presents the estimated costs of producing and harvesting muscadine grapes for the wine and juice markets in North Carolina, an investment analysis of muscadine grape production, and the effects of varying wholesale prices and yields on returns to land and management. The budget was developed for a representative 10 acre grape vineyard assuming a single wire trellis (SWT) and a drip irrigation system. It was also assumed that the management of the vineyard would be near optimal and that all recommended practices would be followed. This information can be useful for farmers considering starting a new muscadine grape vineyard or expanding an existing operation. Mention of a product or vendor does not constitute a guarantee or warranty of the product, nor does it imply recommendation of one product over another. Other products may also be suitable depending on soils, weather conditions, farm history, and nest pressures

Budget Contents

Monthly and annual cost estimates by operation

- Site Preparation
- Year 1: Planting Year

- Year2: First Harvest Year

Year 3: Second Harvest Yes
 Years 4 through 20: Full Production
Trellis Construction Costs
Monthly Cost Summary
Monthly Labor Requirement Summary
Investment Analysis
Estimated Costs and Returns for Varying Yields and Wholesale Prices

Estimated Production Costs per Acre for Muscadine Grapes Grown for the Wine and Juice Markets, Single Wire Trellis System with Drip Irrigation Site Preparation

Month August	Type of Operation	Costs	• •			
August			Costs	Costs	Costs	Costs
August						
	Attend Grower Meetings		5.00	8 4 5	13 45	
	Apply Herbicide	3 4 3	5.00	5.28	8 71	
	dyphosate	0.40	17 50	0.20	17.50	
Total Aug	ust	\$3.43	\$22.50	\$13.73	\$39.65	
November			+			
	Plow Field	12.31		13.94	26.25	
	Disc Field	5.31		6.97	12.28	
	Order & Plant cover crop	2.93	50.00	4.44	57.36	
	Apply Nutrients	2.93		4.44	7.36	
	Lime		77.00		77.00	
	Triple Superphosphate		20.40		20.40	
	Order plants		599.50	2.64	602.14	
Total Nove	ember	\$23.48	\$746.90	\$32.42	\$802.80	
December						
	Order trellis supplies*		1,817.60	10.56	1,828.16	
Total Dece	ember	\$0.00	\$1,817.60	\$10.56	\$1,828.16	
Annual Adr	ministrative Costs					
	Real Estate Taxes		0.00		0.00	
	Management Fee		0.00		0.00	
	Net Land Rent		0.00		0.00	
	Miscellaneous		20.00		20.00	
	Overhead (Utilites, legal fees, etc.)		15.00		15.00	
Total Annu	ual Administrative Costs	\$0.00	\$35.00	\$0.00	\$35.00	
Seasonal C	Costs					
	1/2 Ton Pick-up	16.48		25.34	41.82	
	Operating Capital		0.00		0.00	
Total Seas	sonal Costs	\$16.48	\$0.00	\$25.34	\$41.82	
TOTAL SIT		\$43.38	\$2,622.00	\$82.05	\$2,747.43	

Estimated Materials Costs for a Single Wire Trellis for a 10-Acre Vineyard

Trellis Materials	Rate/ Acre	Unit	Cost per Unit	Total Cost	Your Cost
Treated 4" x 8' Posts	2180	ea	5.00	10,900.00	
Treated 6" x 8' Posts	528	ea	7.00	3,696.00	
Treated 4" x 4"x 6' Timbers	264	ea	5.00	1,320.00	
Wire, 100-pound rolls of # 9 galvanized	30	rolls	74.00	2,220.00	
Staples	50	lbs	0.80	40.00	
Total Trellis Materials Cost				\$18,176.00	

Estimated Construction Costs for a Single Wire Trellis for a 10-Acre Vineyard

	Equipment	Materials	La	bor	Total	Your
Operation	Costs	Costs	Hours	Costs	Costs	Cost
Materials Cost		18,176.00			18,176.00	
Mark rows and post locations			40	330.00	330.00	
Distribute posts	340.38		40	330.00	670.38	
Drive line posts (2 workers @ 3min/post)	1,091.04		218	1,798.50	2,889.54	
Auger and set end posts (2 workers @ 5 min/post)	363.93		88	726.00	1,089.93	
Build Trellis			150	1,237.50	1,237.50	
TOTAL COSTS	\$1,795.35	\$18,176.00	536	\$4,422.00	\$24,393.35	

Estimated Production Costs per Acre for Muscadine Grapes Grown for the Wine and Juice Markets, Single Wre Trellis System with Drip Irrigation First Year: Planting and Trellis Construction

Month	Type of Operation	Equipment Costs	Materials Costs	Labor Costs	Total Costs	Your Costs
	.),,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,					
January		00.02	¢0.00	¢0.00	¢0.00	
February	11 y	ψ0.00	ψ0.00	ψ0.00	ψ0.00	
Total Febru	lary	\$0.00	\$0.00	\$0.00	\$0.00	
March	Duild Teellie	470 50		440.00	004 70	
	Build Trellis Auger vine holes ¹	179.53		442.20 230.21	621.73 235.24	
	Irrigation system preparation	0.00		12.67	12.67	
Total March	1	\$184.56	\$0.00	\$685.08	\$869.64	
April	Orden Drugging Fruitmont			40.50	10.50	
	Plant vines (2 min/vine)			77.09	77.09	
Total April		\$-	\$-	\$ 87.65	\$ 87.65	
Мау						
	Order & Replant ²		30.25	10.56	40.81	
	Growth tube installation	7 22	139.52	42.24	131.76	
	Fertilize	4.12		6.34	10.46	
	10-10-10		6.54		6.54	
	Apply Herbicide	3.42		5.28	8.70	
	flumioxazin (Chateau)	0.00	37.50	204 40	37.50	
	Mow alleys	5.59		504.13 6.34	11.93	
Total May		\$20.36	\$213.81	\$381.22	\$615.39	
June						
	Apply Herbicide	3.42	F0 7-	5.28	8.70	
	flumioxazin + paraquat	7 22	50.70	6.24	50.70 12.56	
	Fertilize	4.12		6.34	10.46	
	10-10-10		6.54		6.54	
	Train/Prune (4 min/vine)	0.00		152.06	152.06	
	Mow alleys (2X)	11.19		12.67	23.86	
Total June		\$25.95	\$57.24	\$182.69	\$265.88	
ouly	Irrigate	7.22		6.34	13.56	
	Fertilize	4.12		6.34	10.46	
	10-10-10		6.54		6.54	
	Apply Insecticide	3.42	0.00	5.28	8.70	
	Train/Prune (4min/vine)	0.00	9.00	152.06	9.00 152.06	
	Mow alleys (2X)	11.19		12.67	23.86	
Total July		\$25.95	\$15.54	\$182.69	\$224.18	
August						
	Attend Grower Meetings	2 / 2	5.00	8.45	13.45	
	sethoxydim (Poast 1.5 EC)	17.06	5.20	17.06	
	Irrigate	7.22		6.34	13.56	
	Mow alleys	5.59		6.34	11.93	
Total Augu	st	\$16.24	\$22.06	\$26.40	\$64.70	
September	Irrigate	7 22		6.34	13.56	
	Growth tube removal	1.22		21.12	21.12	
Total Septe	mber	\$7.22	\$0.00	\$27.46	\$34.68	
October - De	ecember					
	Apply Herbicide (spot spray)	3.35	17.50	5.28	8.63	
Total Octob	gryphosate	\$3.35	\$17.50	\$5.28	\$26.13	
Annual Adm	inistrative Costs	\$0.00	<i>Q</i> 00	\$0. <u>2</u> 0	\$20.10	
	Real Estate Taxes		0.00		0.00	
	Management Fee		0.00		0.00	
	Net Land Rent		0.00		0.00	
	wiscellaneous Overhead (Utilities, legal fees, etc)		40.00		40.00 30.00	
	Interest on Accumulating Investment		0.00		0.00	
Total Annua	al Administrative Costs		\$70.00		\$70.00	
Seasonal Co	osts					
	1/2 Ton Pick-up	32.96	0.00	50.69	83.64	
Total Seaso	onal Costs	\$32.96	\$0.00	\$50.69	\$83.64	
		Ç02.00		200.00		
TOTAL FIR	ST YEAR COSTS	\$316.60	\$396.15	\$1,629.14	\$2,341.89	

Notes:

¹Auger vine holes: 2 workers @ 3 min/vine

2Order & Replant 5% of the initial plants

Estimated Production Costs per Acre for Muscadine Grapes Grown for the Wine and Juice Markets, Single Wire Trellis System with Drip Irrigation Second Year: First Harvest (yield = 1 ton per acre)

		Equipment	Materials	Labor	Total	Your
Month	Type of Operation	Costs	Costs	Costs	Costs	Costs
Januarv						
	Dormant Pruning (10min/vine)	0.00		380.16	380.16	
Total Janua	ary	\$0.00	\$0.00	\$380.16	\$380.16	
Total Febru	Jary	\$0.00	\$0.00	\$0.00	\$0.00	
March						
	Irrigation system preparation	4 12		12.67	12.67	
	10-10-10	4.12	13.08	0.34	13.08	
	Apply Herbicide	3.42		5.28	8.70	
T . 4 . 1 M 1	flumioxazin (Chateau)+g	glyphosate	55.88	¢04.00	55.88	
April	n	\$7.54	\$68.96	\$24.29	\$100.79	
74211	Irrigate	0.00		0.00	0.00	
	Mow alleys	5.59		6.34	11.93	
Total April		\$5.59	\$0.00	\$6.34	\$11.93	
way	Irrigate	14.44		12.67	27.11	
	Fertilize	4.12		6.34	10.46	
	10-10-10		13.08		13.08	
	Train/Prune (8 min/vine)	0.00		304.13	304.13	
Total May	wow alleys	\$24.16	\$13.08	\$329.47	\$366.71	
June						
	Leaf Analysis		4.00	2.64	6.64	
	Irrigate	14.44		12.67	27.11	
	flumioxazin + glufosinat	e (Relv)	111.50	3.20	111.50	
	Mow alleys (2X)	11.19		12.67	23.86	
Total June		\$29.06	\$115.50	\$33.26	\$177.82	
July	Irrigate	14.44		12.67	27 11	
	Fertilize	4.12		6.34	10.46	
	10-10-10		13.08		13.08	
	Apply Insecticide	3.42		5.28	8.70	
	chlorpyritos (Lorsban 48 Mow allevs (2X)	=) 11 10	7.74	12.67	23.86	
Total July	mon anoyo (Ext)	\$33.18	\$20.82	\$36.96	\$90.96	
August						
	Attend Grower Meetings	14.44	5.00	8.45	13.45	
	Apply Herbicide	14.44		12.67	13.93	
	sethoxydim (Poast 1.5 E	EC)	17.06		17.06	
	Mow alleys	5.59		6.34	11.93	
Total Augu	st	\$25.52	\$22.06	\$35.90	\$83.48	
September	Custom harvesting1	107.81		2.64	110.45	
	Irrigate	14.44		12.67	27.11	
Total Septe	ember	\$122.25	\$0.00	\$15.31	\$137.56	
Uctober	Apply Herbicide (spot spray)	3 35		5.28	8.63	
	glyphosate	0.00	17.50	0.20	17.50	
Total Octol	per	\$3.35	\$17.50	\$5.28	\$26.13	
November	Densir Trellis			04.40	04.40	
Total Nove	mber	\$0.00	\$0.00	21.12 \$21.12	21.12 \$21.12	
December		Q 0.00	\$0.00	<i>v21112</i>	¥21112	
Total Dece	mber	\$0.00	\$0.00	\$0.00	\$0.00	
Annual Adr	ninistrative Costs		0.00		0.00	
	Management Fee		0.00		0.00	
	Net Land Rent		0.00		0.00	
	Miscellaneous		40.00		40.00	
	Overhead (Utilities, legal fees, etc)		30.00		30.00	
Total Annu	Interest on Accumulating Investment al Administrative Costs	\$0.00	0.00 \$70.00		0.00 \$70.00	
Seasonal C	osts	0.00	Ç70.00		¢10.00	
	1/2 Ton Pick-up	32.96		50.69	83.64	
T.4.1 0	Operating Capital	Ann / -	0.00	650 0 -	0.00	
I otal Seas	onal Costs	\$32.96	\$0.00	\$50.69	\$83.64	
TOTAL SE	COND YEAR COSTS	\$283.60	\$327.92	\$938.78	\$1,550.30	

Notes:

Estimated Production Costs per Acre for Muscadine Grapes Grown for the Wine and Juice Markets, Single Wire Trellis System with Drip Irrigation Third Year: Second Harvest (yield = 3 tons per acre)

		Equipment	Materials	Labor	Total	Your
Month	Type of Operation	Costs	Costs	Costs	Costs	Costs
January	Dormant mechanical pruning	255.00			255.00	
	Dormant pruning (10min/vine)	0.00		380.16	380.16	
Total Janua	ry	\$255.00	\$0.00	\$380.16	\$635.16	
February Total Febru	ary	\$0.00	\$0.00	\$0.00	\$0.00	
March	Industrial and an annual tra			40.07	40.07	
	Irrigation system preparation Fertilize	2.09		12.67	12.67 5.26	
	10-10-10		19.62		19.62	
	Apply Herbicide	3.42	EE 00	5.28	8.70	
Total March	iumioxaziri (Chateau) +gi	\$5.52	\$75.50	\$21.12	\$102.13	
April						
	Irrigate	0.00		0.00	0.00	
Total April	Mow alleys	\$5.59	\$0.00	\$6.34	\$11.93	
May						
	Irrigate	21.66		19.01	40.67	
	Fertilize 10-10-10	2.09	19.62	3.17	5.26 19.62	
	Apply Insecticide (Prebloom)	5.72	13.02	5.28	11.00	
	carbaryl (Sevin 80 WP)		6.30	-	6.30	
	Apply Fungicide	5.72	40.00	5.28	11.00	
	myciobutanii (Nova 40 W) Mow alleys	5.59	12.00	6.34	12.00	
Total May	mon anoyo	\$40.78	\$37.92	\$39.08	\$117.78	
June						
	Leaf Analysis Irrinate	21 66	4.00	2.64	6.64	
	Apply Herbicide	3.42		5.28	8.70	
	flumioxazin + glufosinate (Rely)	111.50		111.50	
	Apply Insecticide	5.72	=	5.28	11.00	
	carbaryl (Sevin 80 WP) Apply Europicide	5 72	7.88	5 28	7.88 11.00	
	captan (Captan 50 WP)	0.72	13.60	0.20	13.60	
	Mow alleys (2X)	11.19		12.67	23.86	
Total June		\$47.71	\$136.98	\$50.17	\$234.85	
ouly	Irrigate	21.66		19.01	40.67	
	Fertilize	2.09		3.17	5.26	
	10-10-10	0.40	19.62	5.00	19.62	
	chlorovrifos (Lorsban 4E)	3.42	9.00	5.28	9.00	
	Apply Fungicide	5.72		5.28	11.00	
	captan (Captan 50 WP)		13.60		13.60	
Total July	Mow alleys (2X)	11.19 \$44.08	\$42.22	12.67 \$45.41	\$131.72	
August		\$11.00	V.L.LL	 	\$101.12	
	Attend Grower Meetings		5.00	8.45	13.45	
	Irrigate	21.66		19.01	40.67	
	Apply Herbicide sethoxydim (Poast 1.5 EC) 3.42	17.06	5.28	8.70 17.06	
	Mechanical prunning (summer)	127.50			127.50	
	Mow alleys	5.59		6.34	11.93	
September	st	\$158.18	\$22.06	\$39.07	\$219.32	
Sabreninel	Custom harvesting1	307.81		2.64	310.45	
	Irrigate	21.66		19.01	40.67	
Total Septe	mber	\$329.47	\$0.00	\$21.65	\$351.12	
October	Apply Herbicide (spot sprav)	3.35		5.28	8.63	
	glyphosate		17.50		17.50	
Total Octob	er	\$3.35	\$17.50	\$5.28	\$26.13	
November	Repair Trellis			21.12	21.12	
Total Nover	nber	\$0.00	\$0.00	\$21.12	\$21.12	
December						
Appuel Adm	nber	\$0.00	\$0.00	\$0.00	\$0.00	
Annual Aum	Real Estate Taxes		0.00		0.00	
	Management Fee		0.00		0.00	
	Net Land Rent		0.00		0.00	
	Niscellaneous Overhead (Utilities, legal fees, etc)		40.00 30.00		40.00 30.00	
	Interest on Accumulating Investment		0.00		0.00	
Total Annua	al Administrative Costs		\$70.00		\$70.00	
Seasonal Co	1/2 Top Pick up	22.02		F0 60	02.64	
	Operating Capital	32.96	0.00	90.00	0.00	
Total Seaso	nal Costs	\$32.96	\$0.00	\$50.69	\$83.64	
		#000 0 ·	0400 VT	0000 0-	60.00 t of	
TOTAL THI	RD YEAR COSTS	\$922.64	\$402.17	\$680.09	\$2,004.90	

Notes:

Estimated Production Costs per Acre for Muscadine Grapes Grown for the Wine and Juice Markest, Single Wire Trellis System with Drip Irrigation Fourth through Twentieth Years (yield = 8.0 tons per acre)

		Equipment	Materials	Labor	Total	Your
Month	Type of Operation	Costs	Costs	Costs	Costs	Costs
January						
	Dormant mechanical pruning	255.00		380 16	255.00 380.16	
Total Janua	ary	\$255.00	\$0.00	\$380.16	\$635.16	
February Total Febru	arv	\$0.00	\$0.00	\$0.00	\$0.00	
March						
	Irrigation system preparation Fertilize	2.09		12.67	12.67 5.26	
	10-10-10	2.00	39.24	0.11	39.24	
	Apply Herbicide	3.42		5.28	8.70	
Total March	flumioxazin (Chateau) +gly	phosate \$5.52	55.88 \$95.12	\$21.12	\$121.75	
April	•	\$0.0 <u>2</u>	000.12	V 21112	¢121.10	
	Irrigate	0.00		0.00	0.00	
Total April	mow alleys	\$5.59	\$0.00	\$6.34	\$11.93	
May						
	Irrigate	21.66		19.01	40.67	
	10-10-10	2.05	26.16	3.17	26.16	
	Apply Insecticide (Prebloom)	5.72		5.28	11.00	
	carbaryl (Sevin 80 WP)	11 /3	6.30	10 57	6.30	
	myclobutanil (Nova 40 W)	2X	32.00	10.07	32.00	
	Spray Solubor (20% B)	5.72	0.70	5.28	11.70	
Total May	Mow alleys	\$52.21	\$65.16	6.34 \$49.65	\$167.02	
June		φJ2.21	<i>4</i> 03.10	\$ 4 9.05	\$107.02	
	Leaf Analysis		4.00	2.64	6.64	
	Irrigate	21.66		19.01	40.67	
	flumioxazin + glufosinate (F	Rely)	111.50	5.20	111.50	
	Apply Insecticide	5.72		5.28	11.00	
	carbaryl (Sevin 80 WP)	5 72	7.88	5 28	7.88	
	azoxystrobin (Abound 2.08	SC)	19.79	0.20	19.79	
	Apply Fungicide			= 00		
	captan+Topsin Mow alleys (2X)	5.72	42.10	5.28	53.10 23.86	
Total June	mon anoyo (2x)	\$53.42	\$185.26	\$55.45	\$294.14	
July						
	Irrigate Apply Fundicide	21.66		19.01	40.67	
	captan (Captan 50 WP)		13.60		13.60	
	Apply Fungicide	5.72	40.70	5.28	11.00	
	Apply Insecticide	3.42	19.79	5.28	8.70	
	chlorpyrifos (Lorsban 4E)		9.00		9.00	
Total July	Mow alleys (2X)	11.19 \$47.71	\$42.20	12.67	\$127.62	
August		φ 4 7.71	942.39	φ 4 1.55	\$137.0Z	
-	Attend Grower Meetings		5.00	8.45	13.45	
	Apply Herbicide	3.42	17.06	5.28	8.70	
	Irrigate	21.66	17.00	19.01	40.67	
	Mechanical prunning (summer)	127.50			127.50	
Total Augu	Mow alleys	5.59 \$158.18	\$22.06	6.34 \$39.07	\$219.32	
September						
	Custom harvesting1	807.81		2.64	810.45	
Total Septe	mber	\$829.47	\$0.00	\$21.65	\$851.12	
October						
	Apply Herbicide (spot spray)	3.35	17 50	5.28	8.63	
Total Octob	gryphosate	\$3.35	\$17.50	\$5.28	\$26.13	
November	Den ele Terll'e				a	
Total Nove	Repair Trellis	\$0.00	\$0.00	\$21.12 \$21.12	\$21.12	
December		\$0.00	\$0.00		÷22	
Total Decer	nber	\$0.00	\$0.00	\$0.00	\$0.00	
Annual Adm	Real Estate Taxes		0.00		0.00	
	Management Fee		0.00		0.00	
	Net Land Rent		0.00		0.00	
	Overhead (Utilities, legal fees, etc)		40.00		40.00 30.00	
	Interest on Accumulating Investment		0.00		0.00	
Total Annua Seasonal Co	al Administrative Costs		\$70.00		\$70.00	
Jeasona U	1/2 Ton Pick-up	32.96		50.69	83.64	
	Operating Capital		0.00		0.00	
I otal Seaso	onal Costs	\$32.96	\$0.00	\$50.69	\$83.64	
TOTAL AN	NUAL COSTS	\$1,443.41	\$497.49	\$698.05	\$2,638.95	

Notes:

Estimated Monthly and Annual Production Costs per Acre for Muscadine Grapes Grown for the Wine and Juice Markets Single Wire Trellis System with Drip Irrigation

Year & Month	Equipment Costs	Material Costs	Labor Costs	Total Costs	Your Costs
Site Preparation	0.00	0.00	0.00	0.00	
January	0.00	0.00	0.00	0.00	
March	0.00	0.00	0.00	0.00	
April	0.00	0.00	0.00	0.00	
May	0.00	0.00	0.00	0.00	
June	0.00	0.00	0.00	0.00	
August	3.43	22.50	13.73	39.65	
September	0.00	0.00	0.00	0.00	
October	0.00	0.00	0.00	0.00	
November	23.48	746.90	32.42	802.80	
Annual Charges	0.00	35.00	0.00	35.00	
Seasonal Charges	16.48	0.00	25.34	41.82	
Total Site Preparation	43.38	2,622.00	82.05	2,747.43	
First Year					
January	0.00	0.00	0.00	0.00	
February	0.00	0.00	0.00	0.00	
March	184.56	0.00	685.08	869.64	
April May	20.36	0.00 213.81	87.65 381.22	87.65 615.39	
June	25.95	57.24	182.69	265.88	
July	25.95	15.54	182.69	224.18	
August	16.24	22.06	26.40	64.70	
September	7.22	0.00	27.46	34.68	
November	3.35 0.00	0.00	5.∠8 0.00	20.13	
December	0.00	0.00	0.00	0.00	
Annual Charges	0.00	70.00	0.00	70.00	
Seasonal Charges	32.96	0.00	50.69	83.64	
Total First Year	316.60	396.15	1,629.14	2,341.89	
Second Year (Yield = 1 ton/A	.)				
January	0.00	0.00	380.16	380.16	
March	7.54	68.96	24.29	100.79	
April	5.59	0.00	6.34	11.93	
May	24.16	13.08	329.47	366.71	
June	29.06	115.50	33.26	177.82	
August	25.52	20.82	35.90	90.96	
September	122.25	0.00	15.31	137.56	
October	3.35	17.50	5.28	26.13	
November	0.00	0.00	21.12	21.12	
Annual Charges	0.00	70.00	0.00	70.00	
Seasonal Charges	32.96	0.00	50.69	83.64	
Total Second Year	283.60	327.92	938.78	1,550.30	
Third Year (Yield = 3 tons/A)					
January	255.00	0.00	380.16	635.16	
February	0.00	0.00	0.00	0.00	
March	5.52	75.50	21.12	102.13	
April May	5.59	0.00	6.34 30.08	11.93	
June	47.71	136.98	50.17	234.85	
July	44.08	42.22	45.41	131.72	
August	158.18	22.06	39.07	219.32	
October	329.47	0.00	21.65	351.12	
November	0.00	0.00	21.12	21.12	
December	0.00	0.00	0.00	0.00	
Annual Charges	0.00	70.00	0.00	70.00	
Seasonal Charges	32.96	0.00	50.69	2 004 90	
	522.04	402.11	000.00	2,004.00	
Fourth Year through Twentie	th Year (Yield =	8 tons /A)	200.40	60F 40	
February	255.00	0.00	380.16	0.00	
March	5.52	95.12	21.12	121.75	
April	5.59	0.00	6.34	11.93	
May	52.21	65.16	49.65	167.02	
June	53.42 47 71	185.26	55.45 47 53	294.14	
August	158.18	22.06	39.07	219.32	
September	829.47	0.00	21.65	851.12	
October	3.35	17.50	5.28	26.13	
November	0.00	0.00	21.12	21.12	
Annual Charges	0.00	70.00	0.00	70.00	
Seasonal Charges	32.96	0.00	50.69	83.64	
Total Fourth Year	1,443.41	497.49	698.05	2,638.95	

Monthly Labor Estimates per Acre for Muscadine Grapes Grown for the Wine and Juice Markets Single Wire Trellis System with Drip Irrigation

		Your
Year & Month	Labor	Estimate
	(Person Hours)	
01 B		
Site Preparation	0.000	
January	0.000	
March	0.000	
April	0.000	
May	0.000	
June	0.000	
July	0.000	
August	1.300	
September	0.000	
October	0.000	
November	3.070	
December	1.000	
Seasonal Charges	2.400	
Total Site Preparation	7.770	
First Year		
January	0.000	
February	0.000	
March	76.600	
April	8.300	
way	36.100	
June	17.300	
July	17.300	
August	2.500	
September	2.600	
October	0.500	
November	0.500	
December	0.500	
Seasonal Charges	4.800	
lotai First Year	167.000	
Second Vear		
January	36,000	
February	0.000	
March	2 300	
April	0.600	
May	31 200	
lune	3 150	
luly	3 500	
August	3 400	
Sentember	1.450	
October	0.500	
November	2 000	
December	0.000	
Seasonal Charges	4 800	
Total Second Year	88,900	
	00.000	
Third Year		
January	36.000	
February	0.000	
March	2.000	
April	0.600	
May	3.701	
June	4.751	
July	4.300	
August	3.700	
September	2.050	
October	0.500	
November	2.000	
December	0.000	
Seasonal Charges	4.800	
Total Third Year	64.402	
Fourth Year through Twentieth	Year	
January	36.000	
February	0.000	
March	2.000	
April	0.600	
May	4.702	
June	5.251	
July	4.501	
August	3.700	
September	2.050	
October	0.500	
November	4.000	
December	0.000	
Seasonal Charges	4.800	
Total Annual Labor	68.104	

Breakeven and Net Present Value Analysis for Muscadine Grapes Grown for the Wine
and Juice Markets, Single WireTrellis System with Drip Irrigation

		Total	Total	Net Cash		Discount	Present
	Yield	Costs	Revenue	Flow	Accumulated	Factor	Value of Net
Year	per Acre	per Acre	per Acre	per Acre	Cash Flow	6%	Cash Flow
0	0	3,839.13	0.00	(3,839.13)	(3,839.13)	1.00	(3,839.13)
1	0	5,224.95	0.00	(5,224.95)	(9,064.09)	0.94	(4,929.20)
2	1	1,550.30	500.00	(1,050.30)	(10,114.39)	0.89	(934.76)
3	3	2,004.90	1,500.00	(504.90)	(10,619.28)	0.84	(423.92)
4	8	2,638.95	4,000.00	1,361.05	(9,258.24)	0.79	1,078.08
5	8	2,638.95	4,000.00	1,361.05	(7,897.19)	0.75	1,017.05
6	8	2,638.95	4,000.00	1,361.05	(6,536.14)	0.70	959.49
7	8	2,638.95	4,000.00	1,361.05	(5,175.09)	0.67	905.17
8	8	2,638.95	4,000.00	1,361.05	(3,814.04)	0.63	853.94
9	8	2,638.95	4,000.00	1,361.05	(2,453.00)	0.59	805.60
10	8	3,043.95	4,000.00	956.05	(1,496.95)	0.56	533.85
11	8	2,638.95	4,000.00	1,361.05	(135.90)	0.53	716.98
12	8	2,993.91	4,000.00	1,006.09	870.19	0.50	499.99
13	8	2,638.95	4,000.00	1,361.05	2,231.24	0.47	638.11
14	8	2,638.95	4,000.00	1,361.05	3,592.28	0.44	601.99
15	8	2,712.03	4,000.00	1,287.97	4,880.25	0.42	537.42
16	8	2,638.95	4,000.00	1,361.05	6,241.30	0.39	535.77
17	8	2,638.95	4,000.00	1,361.05	7,602.35	0.37	505.44
18	8	2,638.95	4,000.00	1,361.05	8,963.40	0.35	476.83
19	8	2,638.95	4,000.00	1,361.05	10,324.45	0.33	449.84
20	8	2,143.40	4,000.00	1,856.60	12,181.05	0.31	578.90
	Total						\$1,567.46

Breakeven Year Total Accumulated Cah Flow Net Present Value Internal Rate of Return 12th Year \$12,181.05 \$1,567.46 7.60%

Estimated Returns to Land & Management per Acre for varying Prices and
Yields for Muscadine Grapes Grown for the Wine and Juice Markets
Single Wire Trellis System with Drip Irrigation

Wholesale Price		Breakeven Yield							
		(Tons)							
(\$/Ton)	7.2	7.6	8	8.4	8.8	(Tons)			
400	(830.29)	(710.29)	(590.29)	(470.29)	(350.29)	9.97			
450	(470.29)	(330.29)	(190.29)	(50.29)	89.71	8.54			
500	(110.29)	49.71	209.71	369.71	529.71	7.48			
550	249.71	429.71	609.71	789.71	969.71	6.65			
600	609.71	809.71	1,009.71	1,209.71	1,409.71	5.98			

Estimated Production Costs, Gross Revenues, and Returns per Acre for Muscadines Grapes Grown for the Wine and Juice Markets Geneva Double Curtain Trellis System with Drip Irrigation

Revised: August 2006

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This budget presents the estimated costs of producing and harvesting muscadine grapes for the wine and juice markets in North Carolina, an investment analysis of muscadine grape production, and the effects of varying wholesale prices and yields on returns to land and management. The budget was developed for a representative 10 acre grape vineyard assuming a Geneva Double Curtain (GDC) trellis and a drip irrigation system. It was also assumed that the management of the vineyard would be near optimal and that all recommended practices would be followed. This information can be useful for farmers considering starting a new muscadine grape vineyard or expanding an existing operation. Mention of a product or vendor does not constitute a guarantee or warranty of the product, nor does it imply recommendation of one product over another. Other products may also be suitable depending on soils, weather conditions, farm history, and nest pressures

Budget Contents

Monthly and annual cost estimates by operation

- Site Preparation

- Year 1: Planting Year

- Year2: First Harvest Year

- Year 3: Second Harvest Year

- Years 4 through 20: Full Production

Trellis Construction Costs

Monthly Cost Summary Monthly Labor Requirement Summary

Investment Analysis

Estimated Costs and Returns for Varying Yields and Wholesale Prices

Estimated Production Costs per Acre for Muscadine Grapes Grown for the Wine and Juice Markets, Geneva Double Curtain Trellis System with Drip Irrigation Site Preparation

		Equipment	Materials	Labor	Total	Your
Month	Type of Operation	Costs	Costs	Costs	Costs	Costs
August						
	Attend Grower Meetings		5.00	8.45	13.45	
	Apply Herbicide	3.43		5.28	8.71	
	glyphosate		17.50		17.50	
Total Au	gust	\$3.43	\$22.50	\$13.73	\$39.65	
Novembe	r					
	Plow Field	12.31		13.94	26.25	
	Disc Field	5.31		6.97	12.28	
	Order & Plant cover crop	2.93	50.00	4.44	57.36	
	Custom Applied Nutrients	2.93		4.44	7.36	
	Lime		77.00		77.00	
	Triple Superphosphate		20.40		20.40	
	Order plants		500.50	2.64	503.14	
Total No	vember	23.48	647.90	32.42	703.80	
Decembe	r					
	Order trellis supplies*		3,092,48	10.56	3.103.04	
Total De	cember	0.00	3.092.48	10.56	3,103.04	
Annual A	dministrative Costs		-,		-,	
	Real Estate Taxes		0.00		0.00	
	Management Fee		0.00		0.00	
	Net Land Rent		0.00		0.00	
	Miscellaneous		20.00		20.00	
	Overhead (Utilities legal fees etc)		15.00		15.00	
Total An	nual Administrative Costs	0.00	35.00	0.00	35.00	
Seasonal	Costs	0.00	20.00	0.00	50.00	
222.501101	1/2 Ton Pick-up	16.48		25.34	41 82	
	Operating Capital	10.40	0.00	20.04	0.00	
Total Sea	eonal Costs	16.48	0.00	25 34	41.82	
i otal dea		10.40	0.00	20.04	41.02	
TOTAL P	REPARATION COSTS	43.38	3,797,88	82.05	3.923.31	
			.,			

Estimated Materials Costs for a Genevia Double Curtain Trellis for a 10-Acre Vineyard

	Rate/		Cost per	Total	Your
Trellis Materials	Acre	Unit	Unit	Cost	Cost
Treated 4" x 8' Posts	1820	ea	5.00	9,100.00	
Treated 6" x 8' Posts (end brace posts)	220	ea	7.00	1,540.00	
Treated 6" x 6 1/2' Posts (inside brace posts)	220	ea	9.40	2,068.00	
Treated 4" x 4" x 6' Timbers	220	ea	5.00	1,100.00	
Wire, 100-pound rolls of # 9 galvanized	45	roll	74.00	3,330.00	
Metalic crossarms	1820	ea	6.50	11,830.00	
Spreader 2"x4"x45"	220	ea	2.00	440.00	
3/8 x 8" galvanized bolt	1820	ea	0.80	1,456.00	
3/16" bolts	220	ea	0.24	52.80	
Staples	10	lb	0.80	8.00	
Total Trellis Materials Cost				\$30,924.80	

Estimated Construction Costs for a Genevia Double Trellis for a 10-Acre Vineyard

	Equipment	ment Materials Labor		oor	Total	Your
Operation	Costs	Costs	Hours	Costs	Costs	Costs
Materials Cost		30,924.80			30,924.80	
Mark rows and post locations			40	330.00	330.00	
Distribute posts	297.84		35	288.75	586.59	
Drive line posts (2 workers @ 3min/post)	900.86		180	1,485.00	2,385.86	
Auger and set end posts (2 workers @ 5 min/post)	301.89		73	602.25	904.14	
Construct Trellis			500	4,125.00	4,125.00	
Total Costs	\$1,500.59	\$30,924.80	828	\$6,831.00	\$39,256.39	

Estimated Production Costs per Acre for Muscadine Grapes Grown for the Wine and Juice Markets, Geneva Double Curtain Trellis System with Drip Irrigation First Year: Planting and Trellis Construction

		Equipment	Materials	Labor	Total	Your
Month	Type of Operation	Costs	Costs	Costs	Costs	Costs
Marah						
Warch	Build Trellis	150.06		683.10	833.16	
	Auger vine holes1	8.40		230.63	239.03	
	Irrigation system preparation			12.67	12.67	
Total March	1	158.46	0.00	926.40	1,084.86	
April	Order Brunning Equipment			10.56	10.56	
	Plant vines (2 min/vine)			63.36	63.36	
Total April		0.00	0.00	73.92	73.92	
May						
	Order & Replant ²		24.75	10.56	35.31	
	Irrigate	6.78	110.40	6.34	13.12	
	Fertilize	4.12		6.34	10.46	
	10-10-10		6.54		6.54	
	Apply Herbicide	3.42		5.28	8.70	
	flumioxazin (Chateau)	0.00	37.50	506 99	37.50	
	Mow alleys	5.59		6.34	11.93	
Total May		19.92	185.27	578.69	783.88	
June						
	Apply Herbicide	3.42	50 C -	5.28	8.70	
	flumioxazin + paraquat	6 79	50.70	6.24	50.70	
	Fertilize	4.12		6.34	10.46	
	10-10-10		6.54		6.54	
	Train/Prune (8 min/vine)	0.00		253.44	253.44	
	Mow alleys (2X)	11.19	53 0 1	12.67	23.86	
I otal June		25.52	57.24	284.06	366.82	
July	Irrigate	6.78		6.34	13.12	
	Fertilize	4.12		6.34	10.46	
	10-10-10		6.54		6.54	
	Apply Insecticide	3.42		5.28	8.70	
	Chlorpyritos (Lorsban 4E)	0.00	9.00	253 44	9.00 253.44	
	Mow alleys (2X)	11.19		12.67	23.86	
Total July		25.52	15.54	284.06	325.12	
August						
	Attend Grower Meetings		5.00	8.45	13.45	
	Apply Herbicide setboy/dim (Poset 1.5 EC)	3.42	17.06	5.28	8.70 17.06	
	Irrigate	6.78	11.00	6.34	13.12	
	Mow alleys	5.59		6.34	11.93	
Total Augus	st	15.80	22.06	26.40	64.26	
September	Indexet.	0.70		0.04	40.40	
	Growth tube removal	0.70		18.48	18.48	
Total Septe	mber	6.78	0.00	24.82	31.60	
October - De	ecember					
	Apply Herbicide (spot spray)	3.35		5.28	8.63	
Total Oatab	glyphosate	2.25	17.50	E 00	17.50	
Annual Adm	inistrative Costs	3.35	17.50	5.20	20.13	
	Real Estate Taxes		0.00		0.00	
	Management Fee		0.00		0.00	
	Net Land Rent		0.00		0.00	
	Miscellaneous		40.00		40.00	
	Interest on Accumulating Investment		0,00		0,00	
Total Annual Administrative Costs			70.00		70.00	
Seasonal Co	osts					
	1/2 Ton Pick-up	32.96		50.69	83.64	
Total Second	Operating Capital	32.06	0.00	50.60	0.00	
.otal Seaso		52.90	0.00	30.03	05.04	
TOTAL FIRS	ST YEAR COSTS	288.20	367.61	2 254 32	2 910 23	

Notes:

¹Auger vine holes: 2 workers @ 3 min/vine ²Order & Replant 5% of the initial plants

Estimated Production Costs per Acre for Muscadine Grapes Grown for the Wine and Juice Markest, Geneva Double Curtain Trellis System with Drip Irrigation Second Year: First Harvest (yield = 1.2 tons per acre)

		Equipment	Materials	Labor	Total	Your
Month	Type of Operation	Costs	Costs	Costs	Costs	Costs
January						
Total Janua	Dormant Pruning (20 min/vine)	0.00	60.00	633.60	633.60	
February	iry	\$U.UU	\$0.00	3033.00	\$033.00	
Total Febru	ary	\$0.00	\$0.00	\$0.00	\$0.00	
March					10.07	
	Irrigation system preparation	4 12		12.67	12.67 10.46	
	10-10-10		13.08	0.01	13.08	
	Apply Herbicide	3.42		5.28	8.70	
Total Marak	flumioxazin (Chateau)+gly	phosate \$7.54	55.88	\$24.20	\$100.70	
April	•	φ1.3 4	<i>4</i> 00.90	\$24.25	\$100.75	
	Irrigate	0.00		0.00	0.00	
Total Accel	Mow alleys	5.59	60.00	6.34	11.93	
May		\$5.59	\$0.00	\$6.34	\$11.93	
,	Irrigate	13.56		12.67	26.24	
	Fertilize	4.12		6.34	10.46	
	10-10-10 Train/Prupe (16 min/vine)	0.00	13.08	506.88	13.08 506.88	
	Mow alleys	5.59		6.34	11.93	
Total May		\$23.28	\$13.08	\$532.22	\$568.58	
June						
	Leat Analysis Irrigate	13.56	4.00	2.64	6.64 26.24	
	Apply Herbicide	3.42		5.28	8.70	
	flumioxazin + glufosinate	Rely)	111.50		111.50	
Total Juna	Mow alleys (2X)	11.19 \$29.19	\$115.50	\$22.26	\$176.04	
July		φ20.10	φ113.30	φ 33.2 0	\$170.94	
•	Irrigate	13.56		12.67	26.24	
	Fertilize	4.12		6.34	10.46	
	10-10-10 Apply Insecticide	3.42	13.08	5.28	13.08	
	chlorpyrifos (Lorsban 4E)		7.74		7.74	
	Mow alleys (2X)	11.19		12.67	23.86	
Total July August		\$32.30	\$20.82	\$36.96	\$90.08	
ruguor	Attend Grower Meetings		5.00	8.45	13.45	
	Irrigate	13.56		12.67	26.24	
	Apply Herbicide	3.42	17.00	5.28	8.70	
	Mow alleys	5.59	17.00	6.34	11.93	
Total Augus	st	\$22.58	\$22.06	\$32.74	\$77.38	
September	Quarters have a the st	400.04		0.04	405.05	
	Irrigate	132.61		2.64	26.24	
Total Septe	mber	\$146.17	\$0.00	\$15.31	\$161.49	
October						
	Apply Herbicide (spot spray)	3.35	17 50	5.28	8.63 17.50	
Total Octob	gryphodato	\$3.35	\$17.50	\$5.28	\$26.13	
November						
Total Novo	Repair Trellis	00.02	\$0.00	\$21.68	\$21.68	
December	liber	\$0.00	<i>\$</i> 0.00	φ31.00	\$31.00	
Total Decer	nber	\$0.00	\$0.00	\$0.00	\$0.00	
Annual Adm	inistrative Costs		0.00		0.00	
	Management Fee		0.00		0.00	
	Net Land Rent		0.00		0.00	
	Miscellaneous		40.00		40.00	
	Overhead (Utilities, legal fee, etc.)		30.00 0.00		30.00 0.00	
Total Annua	al Administrative Costs	\$0.00	\$70.00		\$70.00	
Seasonal Co	osts					
	1/2 Ton Pick-up Operating Capital	32.96	0.00	50.69	83.64	
Total Seaso	onal Costs	\$32.96	\$0.00	\$50.69	\$83.64	
TOTAL SEC	COND YEAR COSTS	\$301.95	\$327.92	\$1,402.37	\$2,032.24	

Notes:

Estimated Production Costs per Acre for Muscadine Grapes Grown for the Wine and Juice Markets, Geneva Double Curtain Trellis System with Drip Irrigation Third Year: Second Harvest (yield = 3.7 tons per acre)

Month	Tune of Operation	Equipment	Materials	Labor	Total	Your
Month	Type of Operation	Costs	Costs	Costs	Costs	Costs
January	Dormant mechanical pruning	255.00			255.00	
	Dormant pruning (20min/vine)	0.00		633.60	633.60	
Total Janua	ary	\$255.00	\$0.00	\$633.60	\$888.60	
Total Febru	ary	\$0.00	\$0.00	\$0.00	\$0.00	
March				10.07	10.07	
	Irrigation system preparation Fertilize	2.09		12.67 3.17	12.67 5.26	
	10-10-10		19.62		19.62	
	Apply Herbicide	3.42	55.00	5.28	8.70	
Total March	tiumioxazin (Cnateau) +giyp	s5.52	\$75.50	\$21.12	\$102.13	
April						
	Irrigate	0.00		0.00	0.00	
Total April	wow alleys	\$5.59	\$0.00	\$6.34	\$11.93	
May						
	Irrigate	20.35		19.01	39.35	
	10-10-10	2.05	19.62	0.17	19.62	
	Apply Insecticide (Prebloom)	5.72		5.28	11.00	
	carbaryl (Sevin 80 WP)	5 72	6.30	5 28	6.30 11.00	
	myclobutanil (Nova 40 W)	0.72	12.00	0.20	12.00	
	Mow alleys	5.59		6.34	11.93	
lotal May		\$39.46	\$37.92	\$39.08	\$116.46	
3416	Leaf Analysis		4.00	2.64	6.64	
	Irrigate	20.35		19.01	39.35	
	Apply Herbicide flumiovazin + glufosinate (R	3.42	111 50	5.28	8.70	
	Apply Insecticide	5.72	111.50	5.28	11.00	
	carbaryl (Sevin 80 WP)		7.88		7.88	
	Apply Fungicide	5.72	13.60	5.28	11.00 13.60	
	Mow alleys (2X)	11.19	10.00	12.67	23.86	
Total June		\$46.39	\$136.98	\$50.17	\$233.53	
July	Irrigate	20.35		19.01	39.35	
	Fertilize	2.09		3.17	5.26	
	10-10-10		19.62		19.62	
	Apply Insecticide chlorovrifos (Lorsban 4E)	3.42	9.00	5.28	8.70 9.00	
	Apply Fungicide	5.72		5.28	11.00	
	captan (Captan 50 WP)	11.10	13.60	10.67	13.60	
Total July	Now alleys (2X)	\$42.77	\$42.22	\$45.41	\$130.40	
August						
	Attend Grower Meetings	20.25	5.00	8.45	13.45	
	Apply Herbicide	3.42		5.28	8.70	
	sethoxydim (Poast 1.5 EC)		17.06		17.06	
	Mechanical prunning (summer)	127.50		6.24	127.50	
Total Augu	st	\$156.87	\$22.06	\$39.07	\$218.00	
September						
	Custom harvesting ¹	382.21		2.64	384.85 39.35	
Total Septe	mber	402.56	0.00	21.65	424.20	
October						
	Apply Herbicide (spot spray)	3.35	17 50	5.28	8.63 17.50	
Total Octob	ber	\$3.35	\$17.50	\$5.28	\$26.13	
November				01.10	04.40	
Total Nove	mber	\$0.00	\$0.00	\$21.12	\$21.12 \$21.12	
December						
Fotal Decer	nber	\$0.00	\$0.00	\$0.00	\$0.00	
amuai Adm	Real Estate Taxes		0.00		0.00	
	Management Fee		0.00		0.00	
	Net Land Rent Miscellaneous		0.00		0.00	
	Overhead (Utilities, legal fees, etc.)		30.00		30.00	
	Interest on Accumulating Investment		0.00		0.00	
Total Annu Seasonal C	al Administrative Costs	\$0.00	\$70.00		\$70.00	
- 54551161 01	1/2 Ton Pick-up	32.96		50.69	83.64	
T. 4.1.5	Operating Capital	000.0-	0.00	6 =0.07	0.00	
l otal Seaso	onal Costs	\$32.96	\$0.00	\$50.69	\$83.64	
TOTAL THI	RD YEAR COSTS	\$990.46	\$402.17	\$933.53	\$2,326.15	

Notes:

Estimated Production Costs per Acre for Muscadine Grapes Grown for the Wine and Juice Markets, Geneva Double Curtain Trellis System with Drip Irrigation Fourth through Twentieth Years (yield = 10.0 tons per acre)

		Equipment	Materials	Labor	Total	Your
Month	Type of Operation	Costs	Costs	Costs	Costs	Costs
January						
	Dormant mechanical pruning	255.00		633.60	255.00 633.60	
Total Janua	ary	\$255.00	\$0.00	\$633.60	\$888.60	
February Total Febru	arv	\$0.00	\$0.00	\$0.00	\$0.00	
March	Intertion and an analysis the			40.07	40.07	
	Irrigation system preparation Fertilize	2.09		12.67	12.67 5.26	
	10-10-10		39.24		39.24	
	Apply Herbicide	3.42	55.00	5.28	8.70	
Total March	flumioxazin (Chateau) +glyp	s5.52	55.88 \$95.12	\$21.12	\$121.75	
April	-					
	Irrigate	0.00		0.00	0.00	
Total April	Now alleys	\$5.59	\$0.00	\$4.95	\$10.54	
May						
	Irrigate	20.35		19.01	39.35	
	10-10-10	2.05	26.16	3.17	26.16	
	Apply Insecticide (Prebloom)	5.72		5.28	11.00	
	carbaryl (Sevin 80 WP)	11 / 3	6.30	10.57	6.30 22.00	
	myclobutanil (Nova 40 W) :	2X	32.00	10.07	32.00	
	Spray Solubor (20% B)	5.72	0.70	5.28	11.70	
Total May	Mow alleys	5.59 \$50.90	S65 16	4.95 \$49.26	\$164.32	
June		\$30.05	<i>4</i> 03.10	φ 4 0.20	\$104.32	
	Leaf Analysis		4.00	2.64	6.64	
	Irrigate	20.35		19.01	39.35	
	flumioxazin + glufosinate (F	3.42 Rely)	111.50	5.20	111.50	
	Apply Insecticide	5.72		5.28	11.00	
	carbaryl (Sevin 80 WP)	5 72	7.88	5 28	7.88	
	azoxystrobin (Abound 2.08	SC) 3.72	19.79	0.20	19.79	
	Apply Fungicide	5.72		5.28	11.00	
	captan+thiophanatemethyl Mow allevs (2X)	(Topsin) 11 19	42.10	9.90	42.10	
Total June	wow alleys (2X)	\$52.11	\$185.26	\$52.68	\$290.05	
July						
	Irrigate Apply Eupgicide	20.35		19.01 5.28	39.35 11.00	
	captan (Captan 50 WP)	0.72	13.60	0.20	13.60	
	Apply Fungicide	5.72		5.28	11.00	
	azoxystrobin (Abound 2.08 SC) Apply Insecticide	3.42	19.79	5.28	19.79 8.70	
	chlorpyrifos (Lorsban 4E)		9.00		9.00	
Total July	Mow alleys (2X)	11.19	642.20	9.90	21.09	
August		\$40.39	\$42.39	\$ 44 .70	\$133.04	
	Attend Grower Meetings		5.00	8.45	13.45	
	Apply Herbicide	3.42	17.00	5.28	8.70	
	Irrigate	20.35	17.00	19.01	39.35	
	Mechanical prunning (summer)	127.50			127.50	
Total Augus	Mow alleys (1) (30' min/acre)	5.59 \$156 97	e22.06	4.95 \$27.60	\$216.61	
September		φ130.07	\$22.00	φ37.09	φ <u>2</u> 10.01	
	Custom harvesting1	1,007.81		2.64	1,010.45	
Total Sente	Irrigate	20.35	\$0.00	19.01 \$21.65	39.35 \$1.049.80	
October		\$1,020.10	\$0.00	φ21.00	¢1,040.00	
	Apply Herbicide (spot spray)	3.35	17.50	5.28	8.63	
Total Octob	glyphosate	\$3.35	17.50 \$17.50	\$5.28	\$26.13	
November			••••••			
Total New	Repair Trellis	60.00	60.00	42.24	42.24	
December	nder	\$0.00	\$0.00	\$42.24	\$42.24	
Total Decer	nber	\$0.00	\$0.00	\$0.00	\$0.00	
Annual Adm	inistrative Costs		0.00		0.00	
	Management Fee		0.00		0.00	
	Net Land Rent		0.00		0.00	
	Miscellaneous Overhead (I Itilities, legal fees, etc)		40.00		40.00	
	Interest on Accumulating Investment		0.00		0.00	
Total Annua	al Administrative Costs		\$70.00		\$70.00	
Seasonal Co	1/2 Ton Pick-up	32.06		50.69	NA 58	
	Operating Capital	32.50	0.00	30.09	0.00	
Total Seaso	onal Costs	\$32.96	\$0.00	\$50.69	\$83.64	
TOTAL AN	NUAL COSTS (4th - 20th Years)	\$1,636.82	\$497.49	\$962.91	\$3,097.23	
Estimated Monthly and Annual Production Costs per Acre for Muscadine Grapes Grown for the Wine and Juice Markets Geneva Double Curtain Trellis System with Drip Irrigation

Year & Month	Equipment	Material	Labor	Total	Your
	00313	00313	00313	00313	00313
Site Preparation	0.00	0.00	0.00	0.00	
February	0.00	0.00	0.00	0.00	
March	0.00	0.00	0.00	0.00	
April	0.00	0.00	0.00	0.00	
June	0.00	0.00	0.00	0.00	
July	0.00	0.00	0.00	0.00	
August	3.43	22.50	13.73	39.65	
September	0.00	0.00	0.00	0.00	
November	23.48	647.90	32.42	703.80	
December	0.00	3,092.48	10.56	3,103.04	
Annual Charges	0.00	35.00	0.00	35.00	
Total Preparation Costs	\$43.38	\$3,797.88	\$82.05	\$3,923.31	
First Year	0.00	0.00	0.00	0.00	
February	0.00	0.00	0.00	0.00	
March	158.46	0.00	926.40	1,084.86	
April	0.00	0.00	73.92	73.92	
May	19.92	185.27	578.69 284.06	/83.88 366 83	
July	25.52 25.52	57.24 15.54	284.06 284.06	325.12	
August	15.80	22.06	26.40	64.26	
September	6.78	0.00	24.82	31.60	
October	3.35	17.50	5.28	26.13	
November	0.00	0.00	0.00	0.00	
Annual Charges	0.00	70.00	0.00	70.00	
Seasonal Charges	32.96	0.00	50.69	83.64	
Total First Year	\$288.29	\$367.61	\$2,254.32	\$2,910.23	
Second Year (Yield = 1.2 ton	s/A)				
January	0.00	0.00	633.60	633.60	
February	0.00	0.00	0.00	0.00	
April	7.54	00.90	24.29 6 34	11 93	
May	23.28	13.08	532.22	568.58	
June	28.18	115.50	33.26	176.94	
July	32.30	20.82	36.96	90.08	
August	22.58	22.06	32.74	161.49	
October	3.35	17.50	5.28	26.13	
November	0.00	0.00	31.68	31.68	
December	0.00	0.00	0.00	0.00	
Annual Charges	0.00	70.00	0.00	70.00	
Total Second Year	\$301.95	\$327.92	\$1,402.37	\$2,032.24	
				_	
January	255.00	0.00	633.60	888.60	
February	0.00	0.00	0.00	0.00	
March	5.52	75.50	21.12	102.13	
April	5.59	0.00	6.34	11.93	
May	39.46	37.92	39.08	233 53	
July	40.39	42.22	45.41	130.40	
August	156.87	22.06	39.07	218.00	
September	402.56	0.00	21.65	424.20	
Uctober	3.35	17.50	5.28	26.13	
December	0.00	0.00	21.12	21.12	
Annual Charges	0.00	70.00	0.00	70.00	
Seasonal Charges	32.96	0.00	50.69	83.64	
Total Third Year	\$990.46	\$402.17	\$933.53	\$2,326.15	
Fourth Year through Twentie	th Year (Yield =	10 tons /A)			
January	255.00	0.00	633.60	888.60	
March	0.00	0.00	0.00	121 75	
April	5.59	0.00	4.95	10.54	
May	50.89	65.16	48.26	164.32	
June	52.11	185.26	52.68	290.05	
JUIY	46.39	42.39 22.06	44.76	133.54	
September	1,028.16	22.00	21.65	1.049.80	
October	3.35	17.50	5.28	26.13	
November	0.00	0.00	42.24	42.24	
December	0.00	0.00	0.00	0.00	
Seasonal Charges	0.00	70.00	0.00	70.00	
Total Annual Costs	\$1,636.82	\$497.49	\$962.91	\$3,097.23	

Monthly Labor Estimates per Acre for Muscadine Grapes Grown for the Wine and Juice Markets Geneva Double Curtain Trellis System with Drip Irrigation

Year & Month	Labor	Your Estimate
Total di Monar	(Person Hours)	Loumato
Site Preparation		
January	0.000	
Hebruary	0.000	
April	0.000	
May	0.000	
June	0.000	
July	0.000	
August	1.300	
September	0.000	
October	0.000	
November	3.070	
Missellanseus Labor	1.000	
Total Pren Year	2.400	
First Year		
January	0.000	
February	0.000	
March	105.840	
April	7.000	
way	54.800	
luly	20.900	
August	20.900	
September	2.350	
October	0.500	
November	0.500	
December	0.500	
Miscellaneous Labor	4.800	
Total First Year	232.590	
Second Veer		
January	60,000	
February	0.000	
March	2.300	
April	0.600	
May	50.400	
June	3.150	
July	3.500	
August	3.100	
September	1.450	
October	0.500	
November	3.000	
Miscellaneous Labor	4 800	
Total Second Year	132 800	
	102.000	
Third Year		
January	60.000	
February	0.000	
March	2.000	
April	0.600	
May	3.701	
July	4.751	
August	3 700	
September	2.050	
October	0.500	
November	2.000	
December	0.000	
Miscellaneous Labor	4.800	
Total Third Year	88.402	
	V	
Fourth Year through Twentleth	rear	
February	0.000	
March	2 000	
April	0.600	
May	4.702	
June	5.251	
July	4.501	
August	3.700	
September	2.050	
October	0.500	
November	4.000	
Miscellaneous Labor	0.000	
Total Annual Labor	92,104	

		Total	Total	Net Cash		Discount	Present
	Yield	Costs	Revenue	Flow	Accumulated	Factor	Value of Net
Year	per Acre	per Acre	per Acre	per Acre	Cash Flow	6%	Cash Flow
0	0.0	5,015.01	0.00	(5,015.01)	(5,015.01)	1.00	(5,015.01)
1	0.0	5,692.01	0.00	(5,692.01)	(10,707.02)	0.94	(5,369.82)
2	1.2	2,032.24	624.00	(1,408.24)	(12,115.26)	0.89	(1,253.33)
3	3.7	2,326.15	1,872.00	(454.15)	(12,569.41)	0.84	(381.32)
4	10.0	3,097.23	5,000.32	1,903.09	(10,666.32)	0.79	1,507.43
5	10.0	3,097.23	5,000.32	1,903.09	(8,763.23)	0.75	1,422.10
6	10.0	3,097.23	5,000.32	1,903.09	(6,860.13)	0.70	1,341.61
7	10.0	3,097.23	5,000.32	1,903.09	(4,957.04)	0.67	1,265.67
8	10.0	3,097.23	5,000.32	1,903.09	(3,053.95)	0.63	1,194.02
9	10.0	3,097.23	5,000.32	1,903.09	(1,150.85)	0.59	1,126.44
10	10.0	3,502.23	5,000.32	1,498.09	347.24	0.56	836.53
11	10.0	3,097.23	5,000.32	1,903.09	2,250.34	0.53	1,002.53
12	10.0	3,452.19	5,000.32	1,548.13	3,798.47	0.50	769.37
13	10.0	3,097.23	5,000.32	1,903.09	5,701.56	0.47	892.24
14	10.0	3,097.23	5,000.32	1,903.09	7,604.65	0.44	841.74
15	10.0	3,170.31	5,000.32	1,830.01	9,434.67	0.42	763.60
16	10.0	3,097.23	5,000.32	1,903.09	11,337.76	0.39	749.15
17	10.0	3,097.23	5,000.32	1,903.09	13,240.86	0.37	706.74
18	10.0	3,097.23	5,000.32	1,903.09	15,143.95	0.35	666.74
19	10.0	3,097.23	5,000.32	1,903.09	17,047.04	0.33	629.00
20	10.0	2,601.67	5,000.32	2,398.65	19,445.69	0.31	747.91
	Total						\$4,443.33

Breakeven and Net Present Value Analysis for Muscadine Grapes Grown for the Wine and Juice Markets, Geneva Double Curtain Trellis System with Drip Irrigation

Breakeven Year	10th Year
Total Accumulated Cah Flow	\$19,445.69
Net Present Value	\$4,443.33
Internal Rate of Return	9.54%

Wholesale Price	Marketable Yield per Acre					Breakeven Yield
			(Tons)			
(\$/Ton)	9	9.5	10	10.5	11	(Tons)
300	(1,663.94)	(1,563.94)	(1,463.94)	(1,363.94)	(1,263.94)	17.32
400	(763.94)	(613.94)	(463.94)	(313.94)	(163.94)	11.55
500	136.06	336.06	536.06	736.06	936.06	8.66
550	586.06	811.06	1,036.06	1,261.06	1,486.06	7.70
600	1,036.06	1,286.06	1,536.06	1,786.06	2,036.06	6.93

Estimated Returns to Land & Management per Acre for varying Prices and Yields for Muscadine Grapes Grown for the Wine and Juice Markets Geneva Double Curtain Trellis System with Drip Irrigation

Muscadine Cultivar Performance in Mississippi

SRSFC Muscadine Agent Training September 13 - 15, 2006 John H. Braswell, Ph. D. Mississippi State University Poplarville, Mississippi Muscadine Grape Cultivar Performance Evaluations 2001 - 2004

- Vineyard 70+ Cultivars and Advanced Breeding Lines (Serves as Repository, Cultural Practices, Breeding)
- Planted in 1992; Geneva Double Trellis
- Optimum Fertility and Supplemental Drip Irrigation
- Observations: Yield, Fruit Quality, Berry size, Scar, Fruit pH, Brix

Purple Skinned Fresh Market Muscadine Cultivars





Purple Skinned Fresh Market Muscadine Cultivars



Purple Fresh Market Cultivars

<u>Cultivar</u>	<u>Flower</u>	<u>Vigor</u>
Alachua	Self Fertile	Medium
Black Beauty	Female	High
Cowart	Self Fertile	Med. High
Ison	Self Fertile	Very High
Jumbo	Female	Med. High
Nesbit	Self Fertile	Medium
Pollyanna	Self Fertile	High
Southland	Self Fertile	Medium
Sugargate	Female	Medium

Purple Fresh Market Muscadine Cultivars

Top 5

- Yield: Nesbit, Jumbo, Cowart, Ison, Polyanna, Blk Beauty*
- Berry size: Black Beauty, Sugargate, Jumbo, Polyanna & Nesbit
- Dry scar: Southland, Alachua, Cowart, Ison & Nesbit
- PH: Nesbit, Sugargate, Cowart, Black Beauty, Alachua
- Brix: Sugargate, Southland, Polyanna, Black Beauty & Ison
- No cultivar appeared in the top 5 of all categories
- Nesbit excelled in all categories except Brix
- Black Beauty & Polyanna High Yield, Large Berry, Brix
- Ison High yield, Dry scar, High brix
- Sugargate Large berry, High brix & pH

Bronze Skinned Fresh Market Muscadine Cultivars





Bronze Skinned Fresh Market Muscadine Cultivars



Bronze Fresh Market Cultivars

<u>Cultivar</u>	Flower	<u>Vigor</u>
Darlene	Female	Low
Fry	Female	Med. High
Higgins	Female	Medium
Janebell	Self Fertile	Medium
Pineapple	Self Fertile	High
Redgate	Self Fertile	High
Summit	Female	High
Sweet Jenny	Female	High
Tara	Self Fertile	High
Triumph	Self Fertile	Medium

Bronze Skinned Fresh Market Cultivars Top 5

- Yield: Janebell, Redgate, Higgins, Summit & Sweet Jenny
- Berry size: Darlene, Sweet Jenny, Fry, Tara & Higgins
- Dry scar: Tara, Pineapple, Triumph, Summit & Higgins
- PH: Tara, Fry, Janebell, Summit & Sweet Jenny
- Brix: Darlene, Triumph, Sweet Jenny, Fry, Summit & Tara
- None appeared in the top 5 of all categories
- Sweet Jenny excelled in all areas except dry scar
- Tara excelled in all areas except high yield
- Summit excelled in all areas except berry size
- Fry & Darlene– large berry & high brix
- Higgins large berry & dry scar

Purple Skinned Wine/Juice Muscadine Cultivars



Purple Skinned Wine/Juice Muscadine Cultivars



Purple Juice / Wine Cultivars

<u>Cultivar</u>	<u>Flower</u>	<u>Vigor</u>
Albermarle	Self Fertile	Med. High
Burgaw	Self Fertile	Med. High
Dulcet	Female	Low Med
Hunt	Female	Very High
Magoon	Self Fertile	Low
Noble	Self Fertile	High
Regale	Self Fertile	High
Tarheel	Self Fertile	High

Purple Skinned Wine/Juice Muscadine Cultivars Top 5

- Highest Yield: Noble, Regale, Tarheel, Hunt & Albermarle
- Berry size: Hunt, Albermarle, Regale, Magoon & Burgaw
- pH: Tarheel, Noble, Albermarle, Dulcet, Hunt & Burgaw
- Brix highest: Magoon, Albermarle, Dulcet, Burgaw & Noble
- Cultivar in the top 5 of all categories was: Albermarle
- Noble excelled in all categories except berry size *
- Hunt excelled in all categories except Brix
- Regale High yield and large berries, high vigor & SF
- Burgaw large berry, high pH & brix, high vigor & SF

Bronze Skinned Wine/Juice Muscadine Cultivars



Bronze Skinned Wine/Juice Muscadine Cultivars



Bronze Juice / Wine Cultivars

<u>Cultivar</u>	<u>Flower</u>	<u>Vigor</u>
Carlos	Self Fertile	Very High
Dixie	Self Fertile	Very High
Dixieland	Self Fertile	Medium
Doreen	Self Fertile	High
Magnolia	Self Fertile	Med. High
Roanoke	Self Fertile	Med. High
Scuppernong	Female	Med. High
Sterling	Self Fertile	Medium
Watergate	Female	Medium
Welder	Self Fertile	High

Bronze Skinned Wine/Juice Muscadine Cultivars Top 6

- Yield: Carlos, Welder, Watergate, Doreen, Magnolia & Sterling
- Berry size: Watergate, Dixieland, Dixie, Carlos, Magnolia & Sterling
- PH: Dixie, Dixieland, Sterling, Roanoake Watergate & Dearing
- Brix: Dixie, Dearing, Sterling, Doreen, Dixieland & Watergate
- Cultivar in the top 6 of all categories: Sterling & Watergate
- Carlos & Magnolia High yield & large berry
- Doreen High yield & high brix
- Dixie & Dixieland Large berry, High pH & high brix

Weed Management in Southern Vineyards



Wayne Mitchem Orchard and Vineyard Floor Management Dept. of Horticultural Science





Competition in young vineyards reduces growth and survivability.









The competitive advantage improves with time!





Same herbicide treatment but the difference is shading!

Influence of Shade on Smallflower Morningglory Dry Weight 10 WAP



Shaw et. al. Weed Science, Vol. 35, Issue 4.

PRE Newly Planted Vineyards

Crop Age	Spring	Summer
Newly Planted	Oryzalin (once soil settles after transplanting)	Oryzalin + Paraquat or Rely (June); Fusilade, or Poast, or Select (as needed for perennial grass weeds).
	Chateau (Once soil settles after transplanting)	Chateau + Paraquat or Rely (June or July); Fusilade, or Poast, or Select (as needed for perennial grass weeds).
	Prowl 3.3 or H2O (vines must be dormant)	Paraquat or Rely (multiple applications as needed); Fusilade, or Poast, or Select (as needed for perennial grass weeds)

Oryzalin Issue

- Green Label vs. Orange Label
 - Orange label has bearing grape use and is less expensive.
 - Green label is for ornamental and nursery uses and therefore priced for that market. It is for non-bearing uses only.
- Generic Oryzalin
 - Same issues exists with generic products.







Weed Response to Herbicides

Weeds	Prowl	Surflan	Chateau
Crabgrass	E	E	E
Fall Panicum	E	G	G
Goosegrass	G	G	E
Pigweed	G	G	E
Lambsquarter	G	G	E
Tropic Croton	Р	Р	E
Florida Pusley	G	G	E
Morningglory	Р	Р	G-E

PRE Established Vineyards

Material	Amount per Acre	Crop Age Restrictions	REI (hrs)	Comments
Oryzalin Surflan 4 AS or FarmSaver Oryzalin	2 to 4 qt	Established Vineyards.	12	Surflan or FarmSaver Oryzalin may be tank mixed with paraquat, glyphosate, or Rely for postemergence weed control. In established vineyards tank mix with simazine for expanded residual control of annual weeds.
Norflurazon Solicam 80 DF	1.25 to 5 lb	Vines established 2+ years.	12	Apply in fall or winter to vineyards having sandy loam or coarser textured soils. Tank mix with glyphosate, paraquat or Rely for control of emerged weeds. Residual control is expanded when Solicam is tank mixed with simazine or Karmex.
Diuron Karmex 80 DF or Karmex XP or Direx 80 DF	2 to 3 lb	Vines established 3+ years.	12	Rainfall soon after application to soils low in clay and <2% organic matter may result in injury. Apply with glyphosate, paraquat or Rely for postemgence weed control.

PRE Established Vineyards

Material	Amount per Acre	Crop Age Restrictions	REI (hrs)	Comments
Simazine Princep 4 L or Princep Cal 90 or various formulations	2 to 4 qt 2.2 to 4.4 lb	Vines established at least 3 years.	12	Tank mix with glyphosate, paraquat, or Rely for postemergence weed control. The addition of oryzalin (Surflan) or norflurazon (Solicam) with simazine will extend residual grass control several weeks.
Flumioxazin Chateau 51 WDG	6 to 12 oz	Newly planted and established vineyards	12	Applications after flowering must be made with hooded or shielded application equipment. Do not apply within 60 days of harvest. Tank mix with glyphosate, paraquat, or Rely for POST weed control. Glyphosate may only be used when vines are dormant. Chateau performs best when an initial application is made (6 to 8 oz/A) followed by a second application (6 to 8 oz/A) when control from initial application fails. Do not apply second application within 30 days of initial or apply more than 6 oz/A per application on soil that has a sand plus gravel content over 80% when vines are less than 3 years of age.

Herbicide Programs for Established Vineyards

Crop Age	Fall	Winter	Spring	Summer
Vines Est. 3 years or more		Glyphosate (mid March)	Simazine + oryzalin + glyphosate, or Karmex + glyphosate	Paraquat or Rely if needed; Poast (for perennial grass control)
		Chateau + glyphosate (mid March)	Chateau + paraquat or Rely (early June)	Paraquat or Rely if needed; Poast (for perennial grass control)
	Simazine + paraquat or Rely (after harvest)		Chateau + paraquat or Rely (mid to late May)	Paraquat or Rely if needed; Poast (for perennial grass control)
PRE Weed Control with Chateau

- Morningglory Species
- Florida pusley
- Palmer amaranth
- Lambsquarter
- Prickly sida
- Venice mallow
- Horseweed
- Tropic croton
- Eveningprimrose





Weed Response to Chateau 08-01-05

Herbicide Treatment*	Palmer Amaranth Control	Morningglory Control	Large Crabgrass Control	% Bare Ground
Chateau 4 oz Fb Chateau 4 oz	98 a	93 ab	98 a	89 ab
Chateau 6 oz Fb Chateau 6 oz	100 a	95 a	98 a	88 ab
Chateau 8 oz Fb Chateau 8 oz	100 a	98 a	100 a	94 a
Nontreated	-	-	-	3 c

*March 29th and June 13th were the two application dates. Gramoxone and X-77 were included at each application time for POST weed control.

Research Funded by SC Peach Council

Chateau + Glyphosate Issue

- Movement of Chateau with glyphosate
 - Volatilization NO!
 - Inversion Yes!
- What causes an inversion?
 - Layer of cool surface air with warmer air in the immediate atmosphere
 - Most common occurrence
 - During calm periods
 - During the morning.

Prevention: Tank mix Chateau with paraquat or Rely after vines leaf out. Neither of theses herbicides have been found to cause the same problem



Chateau injury on apples

PRE Herbicide Rotation

- Prevents selection for weeds a herbicide program does not control
- Aids in resistance management
- Find at least two PRE herbicide programs and rotate them.
- Example
 - Even years use Chateau program
 - Odd years use simazine+oryzalin program

No herbicide program is so good that it can be used forever without eventually failing

– Ask Monsanto









POST Herbicides



Dow AgroSciences



Trademark of Dow AgroSciences LLC











- Handler Safety
 - Gramoxone Inteon
 - Less toxic
 - Less odor
- Concentration
 - Gramoxone Max
 - 3.0 lb ai/gal
 - 1.7 to 2.7 pts/A
 - Gramoxone Inteon
 - 2 lb ai/gal
 - 2.5 to 4 pts/A
- Performance Same

Glyphosate: Choices, Choices, Choices







	Active	Acid	Equivalent Rates		
Brand	Ingredient	Equivalent	Lb ae/acre	Fl. oz./Acre	
Buccaneer	4	3	0.375	16	
Buccaneer Plus			0.56	24	
Glystar Plus			0.75	32	
GlyPhos EX					
Glyphomax Plus					
Honcho Plus					
Roundup Or.					
Gly Star 5	5.4	4	0.375	12	
			0.56	18	
			0.75	24	
Touchdown	3.57	3	0.375	16	
			0.56	24	
			0.75	32	
Roundup Or. Max or	5.5	4.5	0.375	10.7	
WeatherMAX			0.5	15.9	
			0.75	21.3	
Touchdown HITech	б	5	0.375	9.6	
			0.5	14.3	
			0.75	19.2	

A.C. York. 2006 NC Ag. Chem. Manual. P. 399.

Weed Response to Glyphosate Formulations

Herbicide T	% Control – 18 DAA			
Formulation	Rate (oz/A)	MG	JG	Palmer
UltraMax	19.5	94	100	100
WeatherMax	16	92	100	100
Glyfos*	24	92	100	100
Glystar*	24	93	100	100
GlyphoMax*	24	92	100	100
Touchdown IQ	24	93	100	100
Clearout Plus	24	93	100	100

**Induce 0.5 % v/v*

Source: A.C. York, Crop Science Dept., N.C. State University

Aim

- PPO Inhibitor
- POST ONLY! (weeds <4")



- Use rate -0.51 to 1.98 Fl. Oz + NIS or COC
- 14 day interval between applications; 3 Day PHI
- Nightshade, Palmer amaranth, lambsquarters, wild radish/mustard, cocklebur, prickly lettuce, morningglory, dayflower, velvetleaf
- Sucker control
- Prevent contact with desirable portions of plant
 - Shield young vines
 - Necrotic leaf spotting or burn
 - Fruit spotting

NC STATE UNIVERSITY What Do We Know About Aim?

- Cost
 - Competitive with Gramoxone
- Low applicator risk
- Not a non-selective POST product
- Tank mix partner with glyphosate
 - Morningglory
 - Dayflower
 - Florida pusley
 - Eveningprimrose









Other POST Herbicides

- Rely
 - -3 to 4 qt/A
- Poast
 - 1 to 1.5 pts/A with COC
 - Bermudagrass
 - 1.5 pt/A when 4 to 6" of new growth
 - 1 pt/A when regrowth occurs

NC STATE UNIVERSITY Herbicide Injury



Growth Regulators – 2,4-D, dicamba (Banvel), triclopyr (Remedy), fluroxypyr (Starane) and various other formulations and premixes

ALS Inhibitors – Finesse, Oust, Peak, Arsenal, Pursuit, Pateau, Cadre, Cimarron

Non-selective – Glyphosate, Gramoxone Inteon, Rely

Grower Awareness Makes for Being a Good Neighbor



- Inform growers of other crops about sensitivity of grapes to certain herbicides
- Remind growers about drift prevention
- Grape growers need to remember their own failure to prevent drift can cause injury.

Glyphosate Resistant Weeds

- Palmer amaranth (NC, SC, and GA)
 - Chateau PRE is excellent!
 - Gramoxone POST
- Horseweed (NC, SC, TN)
 - Assume everything east of I-95 is infested with glyphosate resistant horseweed – Dr. Alan York, 2006.





Glyphosate Resistant Horseweed



Nandula et. al. Glyphosate Resistant Weeds: Current Status and Future Outlook. Outlooks on Pest Management. August 2005.



Horseweed

- Winter or summer annual
- Germinates in fall or spring and forms basal rosette

Control – POST – Rely; PRE – Karmex, simazine, or Chateau



Is there anything NEW coming relative to herbicides?

NC STATE UNIVERSITY Rage – A Premix of Glyphosate and Aim





Glyphosate 7DAT

Rage 7DAT

In the development phase

NC STATE UNIVERSITY Rage – A Premix of Glyphosate and Aim



Glyphosate 14 DAT



Rage 14 DAT

The addition Aim at 0.5 oz to every quart of glyphosate will improve control of cutleaf eveningprimrose and white clover.

Spartan has Potential in Fruit

- Long residual
- Controls morningglory, pigweeds (including Palmer), lambsquarters, smartweeds, yellow and purple nutsedge, and partial control of some annual grasses.
- Use Pattern
 - Sequential applications
 - Tank mix with oryzalin (expanded grass control)
- Grapes have excellent tolerance



Sandea – Another Possibility

- POST Control
- Controls cocklebur, galinsoga, giant ragweed, common ragweed, pigweed, yellow and purple nutsedge, velvetleaf and wild radish..
- Grapes have good tolerance



Southeast Regional Muscadine Grape Integrated Management Guide



http://www.smallfruits.org/

IPM/Production Guides

Weed Management Considerations for Southeast Vineyards W.E. Mitchem and D.W. Monks www.ces.ncsu.edu/depts/hort/hil/



Spots, Rots and "Where did the grapes go?" – Identification and Control of Muscadine Diseases

Bill Cline, Plant Pathology Department North Carolina State University Horticultural Crops Research Station Castle Hayne, NC



Topics to be covered:

- How to identify fungal diseases on stems, leaves and fruit
- Other problems that can look like disease (but are not!)
- Disease resistance in muscadine
- Organic disease control
- Fungicides, sprayers and spray timing

What Causes Fruit to Rot?

- Mostly fungi!
- Spores are microscopic
- Spread by wind, splashing rain, or insects
- Most spores require moisture to germinate and infect



Black Rot

- Fungus (Guignarida bidwellii f. muscadinii)
- Earliest leaf disease of the season
- Causes leaf spots and superficial scabs on fruit







Black Rot (Continued)

- Control with earlyseason fungicide sprays
- Monitor shoot growth and apply fungicides before disease appears





Powdery Mildew

- Fungus (Uncinula necator)
- Appears as faint white "powder" on young fruit
- Causes brown russeting on surface
- Affected fruit cannot ripen normally; may crack





Bitter rot

- Fungus (Greeneria uvicola)
- Common in 'Carlos' vineyards
- Infects fruit shortly after bloom
- green berries may drop off
- Causes speckling on leaves







Macrophoma rot

- Fungus (Botryosphaeria dothidea)
- Small sunken round spots
- May eventually rot entire berry
- Common on 'Carlos' and 'Triumph' in older vineyards





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Ripe Rot

- Fungus
 (Colletotrichum sp.)
- Spreads by splashing rain, insects
- Clustered in "hot spots" along the cordon
- Brown-colored rot with pink to orange spore masses





Angular leaf spot

- Fungus (Mycosphaerella angulata)
- Light yellow spots in early season
- Becoming angular by late season
- Causes premature defoliation, affects yield and fruit quality





Here are some problems that may look like fungal diseases but cannot be controlled with fungicides . . .

- Insect injury (shown at right)
- Bacterial diseases (Pierce's Disease, Crown Gall, sour rot)
- Abiotic injury (hail, rain splitting, drowning)
- Chemical injury (herbicides, spray burn)



Leaf miner damage (insect)

Pierce's Disease (PD)

- Bacteria (Xylella fastidiosa)
- Muscadines are fairly resistant to PD
- Causes marginal leaf burn on 'Carlos'
- Over-fertilizing can also cause marginal leaf burn


Crown Gall

- Bacteria (Agrobacterium tumefaciens)
- Muscadines are commonly infected
- Fleshy, irregularlyshaped gall
- Associated with cold injury (note aerial roots above point of injury)



Japanese Beetle, June beetle

- Insects
- Leaves are "skeletonized"
- Also feeds on flower parts
- June beetles often feed on ripe fruit



Stink bugs

- Insect
- Egg masses on grape leaves
- Adults feed on many crops
- Punctures grapes and injures seeds, causing fruit drop





Figure 13.18. The green stink bug, Acrosternum hilare (Say), an occasional pest of cotton: (a) adult; (b) beak; (c) eggs; (d) end of egg more enlarged; (e) young nymph; (f) last stage of nymph; $2\times$. (USDA)

Stink bug injury – feeding punctures seeds and causes fruit drop on 'Carlos' in mid-July



Spittlebug

- Insect
- Foamy, sticky masses on stems and leaf petioles
- Immature insects hide in foam





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Brevipalpid mite (flat mites) cause damage on 'Carlos'; look for scars around the stem





Hail damage on stems, leaves and fruit









Gramoxone injury

- Herbicide (contact, non-selective)
- Drift from ground application
- Distorts young expanding leaves
- Yellow spots become tan to brown





Disease Resistance in Muscadines



Noble



Cultivars vary greatly in susceptibility to rots. In general, the dark-fruited types are more resistant



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Unsprayed 'Carlos' 'Doreen' and 'Summit' retain leaves fairly well





At Castle Hayne, NC, unsprayed 'Granny Val' and 'Tara' may not retain enough leaves to ripen normally





In general, dark grapes are more rot resistant than bronze ones



Organic Grapes in SE US?

- Most organic grapes come from arid production regions (west coast of US)
- Organic production of bunch-type grapes in the eastern US is very difficult (diseases, weeds)
- Muscadines are a good candidate for commerical organic production
- Muscadines in backyard plantings are usually not sprayed

Muscadines are a good candidate for organic production --

- Immune to Downy Mildew
- Immune to Bunch Grape Anthracnose
- Resistant to Phomopsis
- Physically tough, thick-skinned
- Sulfur can be used to control the biggest disease threat, Powdery Mildew

Fungicides, Sprayers and Spray Timing



Spray Date #1. . . .

- Mid-May (Before disease is visible!!)
- Shoots 6-10 inches in length
- Flowers not yet open
- Continue every 2 wk until early August



Fungicides – the short version

- Alternate Nova with Captan, apply every 2 wks from Mid-May through August
- Where ripe rot is a problem, replace Captan with Abound, Pristine or Flint
- Use enough water for adequate coverage
 ALWAYS READ AND FOLLOW THE LABEL!!

Sprayers

- Airblast with 20-40 gallons per acre, OR
- High-pressure sprayer with 50-100 gallons per acre
- Sprayer must be designed to reach grapes underneath the canopy



Fan-assisted "airblast" sprayers





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Web Sites

- Southern Region Small Fruit Consortium www.smallfruits.org
- Fruit Disease Information Notes http://www.ces.ncsu.edu/depts/pp/notes/Fr uit/fdin012/fdin012.htm
- Organic Grape Production http://attra.ncat.org/attrapub/PDF/grape.pdf

What is Killing my Vines? Plant Failure in New Vineyards

Bill Cline, Plant Pathology Department North Carolina State University Horticultural Crops Research Station Castle Hayne, NC



There are lots of possible causes for a dead grape vine . . .

- Poor plants
- Poor site
- Poor care
- Drought
- Drowning
- Animal damage
- Storm damage
- Wrong cultivar

- Herbicide injury
- Fertilizer injury
- Cold injury
- Insects
- Diseases
- Weed competition
- Lightning
- Weedeater blight

But site selection is the most important decision you will make





Site Selection

Muscadines do not like "wet feet"!





Use a county soil map to determine whether your site is suitable:

- Soil classification
- Soil profile
- What crops grow well on your soil type?
- External drainage
- Internal drainage
- Most zones are irregular in shape



Following recent heavy rains in SENC (5+ inches) many growers reported young vines dying





In most cases, vine death was associated with wet spots in fields, or areas of "tight" soils with poor internal drainage



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New buds emerging from "dead" or "drowned" vine after flooding event





Weak shoots emerging from trunk of vine defoliated by flooding





Herbicide injury

Gramoxone used for sucker control can girdle young vines





Gramoxone-injured trunk of 2-yr-old 'Carlos' vine (with bark removed to show damage)





In this instance, gramoxone applied to suckers was translocated up the vine, burning the leaf veins throughout the vine





Girdled vines (right) can be cut off and a new shoot re-trained from the stump


Plant source

Weak plants may be infected by a fungal disease and should be culled prior to planting



Cultivar Selection

Supreme is a very productive, large fruited cultivar, but has a reputation for poor vine survival. Two of three vines at Castle Hayne have been cut back to the ground.



'Fry' vines at Castle Hayne have been productive for 5 yr, now suddenly are dying out. Possible root borer injury? Site was previously in grapes for 20+ yrs. Alternating rows of 'Triumph' are not affected



Lightning

Lightning shattered this post and killed several vines in a circular area





Suspected lightning strike on bearing vines damaged most plants in this single row





Re-growth from base of vines in suspected lightning-struck row





Close-up of injured trunk above regrowth



Vines in varying stages of recovery in the affected row





Re-growth beginning at base of injured vine





Cold Injury

Shoot damage in November on an excessively vigorous vine



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Shoot damage in November (cont'd)



Shoot damage in November (cont'd)



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Secondary invaders

- Fungal pathogens
- Ambrosia beetles and other insects

Aerial roots may indicate a stressed vine, due to cold or other trunk injury, or perhaps grape root borer damage





Cultures of a stem-infecting fungus (Botryosphaeria sp.) recovered from cold-damaged grape vines



Old trunk showing remnants of ambrosia beetle damage





Unidentified trunk borer found in "Triumph" muscadine vines at Castle Hayne.





Fungal mycelia (white "threads") and vascular discoloration on an infected grape root. This type of infection is fairly rare on muscadines.





Hurricanes may damage vines and trellis; once down, the heavy, fruit-laden vines are difficult to lift and prone to breakage





QUESTIONS?





SE Small Fruit Consortium 2006 Muscadine Insectioner Adult Female

Pest Management Update

Dan Horton

University of Georgia, Entomology

Experies of Experies of Exper

As with other vine and/or orchard crops, muscadines have an array of insect and mite pests, but muscadine is a native plant & its pests are primarily occasional & can be responded to asneeded



Japanese Beetles are Significant Foliage Pests, and Modestly Important, Occasional Fruit Pests of Muscadine Grapes



Japanese beetle populations get out of hand quickly, especially as soaking, drought-breaking rains prompt heavy, synchronous adult emergence

Defoliation from Japanese beetle is more serious as grapes reach veraison, berry ripening, greater than 10% defoliation is probably injurious, but the key to managing Japanese beetles is to act before they become truly numerous

Japanese Beetle Insecticide Options in Muscadine

acetamiprid (N) Assail 12-h/7-d ++++cyfluthrin (P) Baythroid, Tombstone 12-h/3-d ++++ bifenthrin (P) Fanfare, Tundra 12-h/30-d ++++ carbaryl (C) 12-h/7-d ++++ diazinon (OP) 24-h/28-d +++ dinotefuran (N) Venom 12-h/24-h* ++++ fenpropathrin (P) Danitol 24-h/21-d ++++ imidacloprid (N) Merit, Provado 12-h/DOH ++++ malathion (OP) 12-h/3-d12-h/3-d +++ methomyl (C) 7-d/1 to 14-d +++ phosmet (OP) Imidan 14-d/7 to 14-d ++++



Japanese Beetle References for Grapes in the Eastern US:



- Pfeiffer, D. G. & P. B. Schultz. 1986. Major insect and mite pests of grape in Virginia, Va. Coop. Ext. Service 444-567.
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- Fleming, W. E. 1972. Biology of the Japanese beetle. U.S.D.A. Tech. Bull. 1149, 129 p.
- Potter, D. A. and D. W. Held. 2002. Biology and management of the Japanese beetle. Annu. Rev. Entomol. 47: 175-205.

Sucking Bugs: Stink Bugs, Plant Bugs & Leaf Footed Bugs Feed on Flower Buds, Blooms & Berries Causing Fruit to Shrivel, Spot or Abort









Stink Bugs, Particularly Green Stink Bug, and Plant Bugs are More Commonly Noted as Muscadine Pests, But Common Sense Suggests Respect for All Sucking Bugs on Any Fruit Crop





Sucking Bug Insecticide Options for Muscadines:

```
cyfluthrin (P) Baythroid, Tombstone 12-h/3-d
++++++
bifenthrin (P) Fanfare, Tundra 12-h/30-d
++++
diazinon (OP) 24-h/28-d
++
fenpropathrin (N) Danitol 24-h/21-d
+++
malathion (OP) 12-h/3-d12-h/3-d
+
methomyl (C) 7-d/1 to 14-d
+++
phosmet (OP) Imidan 14-d/7 to 14-d
++
```



Grape Root Borer is a Key Pest of Grape Species Grown in the Southeastern U.S.





Soil Pests of Vineyards and Orchards are Inherently Injurious, Difficult to Manage, and Typically Underestimated Until Injury Symptoms are Evident





Grape Root Borer Management Options Vary in their Efficacy

Chlorpyrifos: Where pre-harvest interval does not preclude applying on-time, control can be quite effective. In GA, where 'Fry' is a key cultivar, oviposition overlaps conflict with Chlorpyrifos' 35-day PHI

Mounding is a reliable, suppressive cultural control which can be expected to provide 60 to 70% reduction of GRB





Lorsban (chlorpyrifos) 4E is the basis for chemical control of Grape Root Borer

It Provides an Effective Soil Barrier Treatment for 30 to 40-Days

Chlorpyrifos' Pre-Harvest Interval in Grapes is 35-Days




Lorsban (chlorpyrifos) 4E for Grape Root Borer Apply NLT 35-Days PH @ 4.5 pts/100g Do Not Allow Drift to Contact Fruit or Foliage Chlorpyrifos 4E may be banded (a) a 2 qt/vine volume Treat: Preventatively, or the Following Year either when GRB Injury is First Observed or After > 02% of vines have injury or pupal cases 30 Days GRB Efficacy





Grape Root Borer Emergence Patterns Snow, Johnson & Lewis, 1991



Mounding for Control of Grape Root Borer Soil Acts as a Barrier to:

Larvae reaching the roots and for Pupae reaching the surface so adults can emerge

Mounds should be 1 ft high & 3 ft wide Up for onset of egg lay & down at close of egg lay





Grape Root Borer References:

- All, J., J. Dutcher, M. Saunders & U. Brady. 1985. Prevention strategies for grape root borer infestations in concord grape vineyards. JEE 78: 666-670.
- Attwood, V. & W. Wylie. 1963. Grape root borer threatens vineyards. AR Farm Res. 12: 6.
- Dutcher, J. & J. All. 1979. Damage impact of larval feeding by the grape root borer in a commercial Concord grape vineyard. JEE 72: 159-161.
- Dutcher, J. & J. All. 1978. Reproductive behavior of *Vitacea* polistiformis. JGES 13: 59-63.
- Harris, J., B. Smith & W. Olien. 1994. Activity of grape root borer in southern MS. JEE 87: 1058-1061.
- Sarai, D. 1969. Effect of burial of grape root borer pupae on adult emergence. JEE 62: 1507-1508.
- Snow, W., D. Johnson & B. Lewis. patterns in the eastern US.

Pierce's Disease, a Bacterial Disease caused by *Xylella fastidiosa*, is Leafhopper Vectored but a Minor Disease in Most Muscadine Cultivars' Pipeline



Pierce's Disease (PD) is a disease of modest importance to muscadine grapes, occasionally causing a marginal leaf burn on mildly susceptible cultivars such as 'Carlos,' while 'Pride' is highly susceptible and may be killed by PD. In CA Wind Grapes the Spread of Pierce's Disease can be Slowed by Use of Insecticides

acetamiprid (N) Assail 12-h/7-d

+++

cyfluthrin (P) Baythroid, Tombstone 12-h/3-d ++++ bifenthrin (P) Fanfare, Tundra 12-h/30-d +++ dinotefuran (N) Venom 12-h/24-h* ++++ fenpropathrin (P) Danitol 24-h/21-d +++ imidacloprid (N) Merit, Provado 12-h/DOH ++++





ree Hotmail 📄 RealPlayer 📄 Windows Marketplace 📄 Windows Media 📄 Windows				
	Apple • Periodical Cicada Control in Apples (Jim Walgenbach, NCSU) • North Georgia IPM • Southern Appalachian Apple IPM Net • North Carolina National IPM Network • Integrated Orchard Management Guide for Commercial Apples in the Southeast			
	Blueberry • Commercial Blueberry IPM and Culture Guide			
	Bramble • Commercial Bramble IPM Guide			
	Bunch Grape • Commercial Bunch Grape IPM Guide			
	Muscadine Grape • Commercial Muscadine Grape Pest Management Guide			
	Strawberry • Commercial Strawberry IPM & Culture Guide			
	Disease and Insect IPM in the Home Orchard			
	Georgia Pest Management Handbook			
	Pesticide Information			

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Minor/Specialty Crop (Fruit) Pest Management Inter-Regional Research Project No. 4 (IR-4) abamectin (Abba, Agri-Mek) +++++ bifenazate (Acramite) +++++ bifenthrin (Fanfare, Tundra) +++ clofentezine (Apollo) ++++ (ovicide) dicofol (Kelthane) +++ etoxazole (Zeal) ++++ (ovicide) fenbutatin-oxide (Vendex) +++ fenpropathrin (Danitol) +++ pyridaben (Nexter, Pyramite) ++++ spirodiclofen (Evidor) ++++

Miticides for Muscadines





What do we know about the health benefits of consuming muscadine grapes and their value-added products?

> Leon Boyd Department of Food Science North Carolina State University Raleigh, North Carolina



Major Topics of Discussion

- Identify compositional differences between different types of grapes
- Identify the health benefits of grape products and their constituents (i.e. Muscadine)
- Discuss mechanisms of action for muscadine and grape components
- □ Significance of findings to average consumers

Major Questions we will answer

- What are the potential health benefits of consuming grapes and their value-added products
- What compounds are contained in grapes and grape products and health benefits?
- □ What does the research data tell us?
- How can this information be used to live a healthier and more full-filling life?

NC STATE UNIVERSITY

History of the Grape

□ Family Vitaceae

- grapes of agriculture known since ancient times
- Iargest fruit crop on earth
- Geographical Regions
 - climate
 - soil types
- Cultivars & Regions
 - Affect Composition of grape & products
 - Economic value

Grape Varieties

- Vitis vinifera
- Vitis rotundifolia (Muscadine) ("scuppernong")
 Vitis labrusca
- □ American Hybrids

Origin of Vitis vinifera

- □ European
 - subgenera *Euvitis* (true grape)
- Vinifera Grapes
 - not very juicy
 - uniformly tender pulp
 - tough skins

Origin of Vitis Rotundifolia

- American-South
 - North Carolina ranked 12th
- □ Muscadine grapes
 - seeded and thick skin
 - Carlos and Noble
 - Fresh table cultivars- Triumph, Nesbitt

Economic value of Muscadine & "valueadded products" to North Carolina economy

- Estimated acreage 1000 @
- □ Yield- 3 tons/acre @ \$937 per acre
- □ Total grapes farm value- \$3.4 mil
- Value-added \$34 million
- Total value + allied industries = \$79 million
- \Box Wineries- 2X since 2002 = 55+

Naturally Occurring Compounds – "Polyphenols" or "Phytochemicals"

□ Anthocyanins

Color pigments

Tannins

Flavor to wine

□ Stilbenes

Phytoalexins

Flavonoids

Antioxidants

Polyphenols

NON-FLAVONOIDS

STILBENES









Resveratrol: a Trihydroxystilbene



Cis-resveratrol

Trans-resveratrol

Grape Polyphenols

- 65% in seeds
- 22% in stems
- 12% in skin
- 1% in pulp

Vine and Harkness, 1997

Factors affecting composition of

grapes:

- **Type of grape-** muscadine vs. viniferia
- Growing conditions- Stress- mold & fungal attack
- Processing conditions
 - Wine, juice, whole grapes
 - Red vs. white grapes
 - Heat vs. room temp extraction
 - Skin fermentation vs. juice fermentation
- Storage conditions
 - Temperature 10C (50F) vs. frozen
 - UV light

Wines = Juice + skin & seed Components

□ Fermentation-

- extraction of polyphenols
- production of alcohol 8-15%
- Extraction of color pigments anthocyanins
- Other advantages
 - extract polyphenols
 - Increased flavor & color
 - Increased antioxidants

Polyphenols in Grapes Producing Red and White Wines

- □ Red
- □ 33% in skin
- □ 0.7% in pulp
- □ 3.4% in juice
- □ 63% in seeds

- □ White
- □ 23% in skin
- □ 0.9% in pulp
- □ 4.5% in juice
- □ 71% in seeds

Amerine and Ough,1980

Red vs. White Wine Phenols (mg/L)

(*Tedesco 2000/ **Lamikanra 1996)

*Polyphenol	<u>Red</u>	<u>White</u>
Catechin	191.3	34.9
Epicatechin	82.0	21.2
Gallic acid	95.0	6.8
Anthocyanin	281.0	0.0
Resveratrol	1.8	0.0

* *Cultivar	Resveratrol	Total Phenol
V. rotundifolia	9.1	42.2
V. vinifera	3.6	14.9
V. Lambruscana	2.6	8.8

Common Flavonoids found in grapes-Muscadine & their products

- *Ellagic acid
- Quercetin
- Genistein
- Epicatechin
- Daidzein
- Catechin
- Epicatechin

- Gallic Acid
- Myricetin
- Kaempferol
- Procyannidins
 - **Resveratrol
 - Trans
 - Cis
 - Bound-glycoside(pecied)

Major classes of flavonoids found in some common foods

Major Food Sources	Types of common flavonoids	
Onions, cherries, apples, broccoli, kale, Tomato, berries, tea, red wine, tartary buckweat	Kaempherol, myricetin, quercetin, rutin	
Parsley, thyme	Apigenin, chrysin, luteolin	
Soybeans, legumes	Diadzein, genistein, glycitein Formononetin	
Apples and tea	Catechin, gallocatechin	
Oranges, grapefruit	Eriodictyol, hesperitin, naringenin	
Limon, aurantilum	Taxifolin	
Cocoa	Gallic acid gallocatechin	

Comparison of major flavonoids in Muscadine, Merlot, and Chardonnay seeds (mg/100g) Toledo 2004

Flavonoid	Muscadine	Merlot	Chardonnay
Gallic acid	99	10	15
Catechin	12	127	358
Epicatechin	96	115	421

Skins lower than seeds & components made up only 26% of antioxidant capacity.

Comparison of antioxidant activity (ORAC) of berry products



Health benefits of Fruits, berries, i.e. Muscadine

- Tied directly to composition of berries
 - Polyphenols
 - Vitamins, Minerals
- Nutritional value- effected by
 - Cultivars, growing & processing conditions
 - Nature of product & "value-added product
 - Grape, juice, wine, skin- seed
 - Processing. White wine vs. red

IMPORTANCE OF FRUITS & THEIR BY-PRODUCTS

- USDA- "Five-a-day" program
- Several Degenerative Diseases
 - Cancer, heart Disease, Arthritis
 - Fruits & veg. Scavenge "FREE RADICALS"
- □ Antioxidants: Scavenge free radical scavengers
- Processing of Fruits: MAY improve or decrease antioxidants
 - **EX:** Canning: Decreases vitamins E & C
 - □ Wine-making: Improves Juice Antioxidants

WHAT ARE FREE RADICAL & WHY ARE THEY SO IMPORTANT?



Berries assist in free radical destruction



Antioxidants decrease inflammatory responses



Polyphenols as Biological Response Modifiers: May reduce Cancer risk factors

- Prevent damage to DNA- Initiation stage
- □ Inhibit liver P450 involved in cancer activation
- Activation of liver detoxifying enzymes
- Direct interaction with carcinogen
- Stimulate increased natural antioxidant systems (liver, lung, fore stomach, small intestine)
- Increased APOPTOSIS- (i.e. control death of cancer cells)
- Repair DNA damage or breakage from carcinogens
How to Measure Potential health benefits of

grape products: The evidence

Types of research studies

- **Population studies-** epidemiological studies
 - Ethnicity, race, life style, disease mortality
 - Ex. French vs. Americans, Japanese men & men American
- Animal studies- i.e. rats dogs, pigs

Animal tissues



- Ex. breast cancer, prostate, liver, endothelial
- Biological activity of food component i.e. grape components
- Invivo Clinical trials- animal & man

Proposed Mode of Action Of Antioxidantsinvitro & invivo evidence

□ Grapes and Wines Have:

- Antioxidants- have free radical scavenging activity
- anti-clotting agents
- carcinostatic/chemopreventive agents
- Dual Actions
 - anti-inflammatory and chemopreventive agents

The FRENCH PARADOX: REAL OR IMAGINED?

Research:

- 1) Reduced CVD risk 40% & increased HDL & lowered LDL
- 2) Denmark; 30% decline CVD = increased wine consumption
 - 3) 1823 males w/3-5oz/day- 30 to 70% lower mortality

than non-drinkers

4) Red wine reduced LDL oxidation: 46- 100% reduction vs.
 3-6% white wines

Origin of the French Paradox

- Massachusetts Normative Aging Study
 - 12-year study
 - 1823 men
 - 3 five-ounce glasses of wine per day
- □ Results
 - 30-70% less mortality than non-drinkers

Holmgren, 1993

Origin of the French Paradox

Copenhagen, Denmark

- 12-year study
- 13,000 people: ages 30-70

□ Results

- 1-2 glasses a day benefits
- greater benefits from 3-5 glasses a day
- 30% decline in CVD

Gronbaek et al.

(1995)

Consumption of juices by Japanese-AmericansVanderbilt University, 2006

□ 1836 persons studied for 10 years

Consumption of 3 glasses/ day vs. 1

Concluded

75% reduction in risk factors associated with Alzheimer's disease

Invitro study: Ellagic acid as Biological Response Modifier (BRD) in cell lines

Present in-

□ Grapes

Strawberries

Raspberries

Inhibits carcinogen-induced cancers of

Lung

Liver

- Skin
- Esophagus

Biological Properties of Ellagic acid: A major phytochemical found in Muscadine

Inhibit chemically induced cancer

Increases apoptosis or programmed death of cancer cells

Repairs and protects DNA from damage

Detoxifies chemicals/carcinogens- preventing liver damage

□ Increases the anti-cancer effects of resveratrol & quercetin

Resveratrol as a Biological Response Modifier

- Prevent LDL (BAD cholesterol oxidation
- Bind metals- cooper
- □ Free radical scavenger (ROS)
- Alter eicosanoid synthesis (i.e. omega-3 vs. omega-6)
- Inhibit platelet aggregation
- Anti-inflammatory activity

Vaso-relaxing activity of smooth muscle

Invitro study: Ellagic acid, Quercetin, and Resveratrol

Improve Apoptosis in Leukemia Cells S. Talcott 2005

- Examined effects singly & in combination
- Results:
 - Quercetin- reduced 48%
 - Resveratrol reduced by 72%
 - Ellagic acid
 No reduction
 - Resveratrol + Ellagic acid 100% reduction
 - Resveratrol + Quercetin No additive effect

In Vitro study: Effects of Grape Seed Powder on Human prostate Cancer Cells

Agarwal et al 2000

Different doses administered at different times

- 50 ug/ml 27% inhibition
- **75 ug/ml** 39%
- 100 ug/ml 76%
- Apoptosis appeared Time dependent response
 - □ 24 hr 77-88%
 - □ 48 hr 65-93%
 - 🗖 72 hr

38-98%

Human study: Biological properties of muscadine products demonstrated in human diabetic model

Akpene Banini, NCSU 2006

Objectives-

- Determine effects of muscadine products on risk factors of diabetes- i.e. blood chemistry & liver enzymes
- Products: wine, dealcoholized wine & juice (Duplin Winery)
- Population: diabetic and non-diabetic
- Duration: 28 days- Collaborators: Duke Univ, NCSU & several physicians

Change in blood Triglycerides following

muscadine product consumption



Changes in blood glucose levels of diabetic and controls consuming muscadine products



Muscadine products decrease Glycated Hemoglobin levels in diabetic subjects



Muscadine value-added products increase blood antioxidants (ORAC)



Conclusions on Health benefits of muscadine

Muscadine and their value-added products

- Are a significant source of phytonutrients
- Have multiple & varied biological response activities.
- Have the "potential" to reduce risk factors for several degenerative diseases
- Are an important source of nutrients in a varied anti-inflammatory diet

An Anti-inflammatory diet can make a difference





Thank you for attending!

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