Consumer Preference for Sustainable Wine Attributes: A Conjoint Analysis

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Issues impacting wine grape production in the Mid-Atlantic region

*Botrytis cinerea* (bunch rot or gray mold) thrives in humid environments and is exacerbated by rain and temperatures between 60 and 75°F (15.5 and 23.9°C) (Wilcox, 2007)
Herbicide use in the vineyard

Potential issues:

• Overuse, applying the wrong herbicide, 2,4-D* drift can damage leaves (insufficient or inefficient leaf area) (Centinari, 2015; Muza, 2015)

• Exposure of bare soil increase soil erosion, degradation, leaching and water runoff (Karl, 2015)

• The number of herbicide-resistant weeds continues to increase (Holt, 1992)

*2,4-dichlorophenoxyacetic acid
Will Mid-Atlantic wine consumers’ purchasing decisions change based on being informed that:

- Grapes are susceptible to bunch rot
- Fungicides are applied to control the disease
- Removing leaves reduces bunch rot threat and 2 fewer fungicide applications are needed
- Continued herbicide use to control weeds could lead to herbicides leaking into groundwater and cause soil erosion
- Cover crops may control weeds and reduce (or eliminate) herbicide use and improve soil health and reduce erosion
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- Cover crops may control weeds and reduce (or eliminate) herbicide use and improve soil health and reduce erosion

Both approaches are labor intensive and a vineyard would need to add $1.00 to the retail price (per bottle) to cover labor costs for each process. Thus, $2.00 would be added to the retail bottle price if both leaves are removed to control bunch rot and a cover crop is planted.
A 15-minute Internet survey was used to collect data, 28 to 30 March 2016

Screener criteria:
• 21 years of age or older
• Not a member of the wine industry
• Resided in New Jersey, New York, or Pennsylvania
• Drank and purchased wine at least once within the previous year

Participants and response rate:
• Pre-tested and administered to Survey Sampling International, LLC panelists
• 753 opened and attempted the survey and 604 qualified and completed the survey

• Participants who completed the survey received a $1.00 incentive
Survey respondents

• Female (59.1%)

• 20% with household incomes of: $25k to $49,999, $50k to $75,999, or $100k to $149,999

• Bachelor’s degree (35.1%) some college/technical school (32.3%)

• Participant and one other adult in the household drinks wine (56.5%)

• 31.5% were Gen X (age 36 to 51) and 31.3% were Millennials (age 21 to 35)

• 32.4% were super core wine consumers, 48.6% were marginal wine consumers
How will Mid-Atlantic wine consumers respond to the two “environmentally friendly” production practices knowing that the price of a 750 mL bottle of wine will need to be increased?
Conjoint Analysis attributes and levels

**Bunch Rot Control**
1. Grape leaves are removed
   - Two fewer fungicide applications
   - $1.00 added to the retail base price

2. Grape leaves are not removed
   - No reduction in fungicide application

**Weed Control**
1. Cover crop is planted
   - Herbicides are not applied
   - $1.00 added to the retail base price

2. No cover crop is planted
   - Herbicides are applied to control weeds

**Retail Base Price**
1. $12.00
2. $16.00
3. $22.00
4. $26.00
### Conjoint Analysis attributes and levels

<table>
<thead>
<tr>
<th>Bunch Rot Control</th>
<th>Weed Control</th>
<th>Retail Base Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Grape leaves are removed</td>
<td>1. Cover crop is planted</td>
<td>1. $12.00</td>
</tr>
<tr>
<td>1. Two fewer fungicide applications</td>
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<td>2. $16.00</td>
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<tr>
<td>1. $1.00 added to the retail base price</td>
<td>2. $1.00 added to the retail base price</td>
<td>3. $22.00</td>
</tr>
<tr>
<td>2. Grape leaves are not removed</td>
<td>2. No cover crop is planted</td>
<td>4. $26.00</td>
</tr>
<tr>
<td>2. No reduction in fungicide application</td>
<td>2. Herbicides are applied to control weeds</td>
<td></td>
</tr>
</tbody>
</table>

If leaves are removed to control bunch rot **and** a cover crop is planted, the retail price for a $26.00 bottle would increase to $28.00.
Conjoint Analysis Orthogonal Array

Bunch Rot Control

1. Grape leaves are removed
   - Two fewer fungicide applications
   - $1.00 added to the retail base price

2. Grape leaves are not removed
   - No reduction in fungicide application

Weed Control

1. Cover crop is planted
   - Herbicides are not applied
   - $1.00 added to the retail base price

2. No cover crop is planted
   - Herbicides are applied to control weeds

Retail Base Price

1. $12.00
2. $16.00
3. $22.00
4. $26.00

Sixteen combinations were possible, but an orthogonal array resulted in 8 non-repeating combinations (and 2 holdout cases)
Regardless of varietal (e.g. Chardonnay, Cabernet Sauvignon, Merlot), how likely (1 = very unlikely to 7 = very likely) would you be to purchase a 750ml glass bottle of wine to serve to family and/or friends in your home?

- **Bunch Rot Control**
  - Grape leaves are not removed
  - No reduction in fungicide application

- **Weed Control**
  - Cover crop is planted
  - Herbicides are not applied
  - $1.00 added to the retail base price

- **Retail Base Price**
  - $22.00
Which attribute had the highest Average Importance?

- Bunch rot control: 20.76%\(^z\)
- Weed control: 21.49%
- Retail base price: 57.40%

\(^z\)A higher value indicates a greater importance; Pearson's R = 0.995; significance = 0.000
Levels within attributes that received positive utility ratings

• Removing leaves to control bunch rot with a $1.00 surcharge

• $12.00 and $16.00 retail base prices

Most preferred scenario:

Bunch Rot Control
• Grape leaves are removed
• Two fewer fungicide applications
• $1.00 added to the retail base price

Weed Control
• Cover crop is planted
• Herbicides are not applied
• $1.00 added to the retail base price

Retail Base Price/ Final Retail Price
$12.00/ $14.00

• Planting a cover crop to suppress weeds with a $1.00 surcharge
Conjoint Analysis segmentation variables

<table>
<thead>
<tr>
<th>Participants level of interest in purchasing wines based on:</th>
<th>Grapes were grown using minimal insecticides and herbicides</th>
<th>Cover crops used in the vineyard to control weeds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all interested</td>
<td>5.00%</td>
<td>4.30%</td>
</tr>
<tr>
<td>Slightly and moderately interested</td>
<td>27.00%</td>
<td>44.00%</td>
</tr>
<tr>
<td>Very and extremely interested</td>
<td>68.00%</td>
<td>51.70%</td>
</tr>
</tbody>
</table>
Average Importance based on interest in purchasing wines made from grapes grown using minimal insecticides and herbicides

22.89%  19.89%
Not at all interested

60.23%  61.75%
Slightly and moderately interested

55.53%
Very and extremely interested

Bunch rot control  Weed control  Retail base price

*A higher value indicates a greater importance; Pearson’s R = 0.995; significance = 0.000
Average Importance based on interest in purchasing wines made from grapes grown using minimal insecticides and herbicides

Arrows show changes in Average Importance compared to the overall Conjoint Analysis

<table>
<thead>
<tr>
<th>Interest Level</th>
<th>Bunch rot control</th>
<th>Weed control</th>
<th>Retail base price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all interested</td>
<td>22.89%</td>
<td>16.88%</td>
<td></td>
</tr>
<tr>
<td>Slightly and moderately interested</td>
<td>19.89%</td>
<td>17.71%</td>
<td></td>
</tr>
<tr>
<td>Very and extremely interested</td>
<td>20.28%</td>
<td>23.39%</td>
<td></td>
</tr>
</tbody>
</table>

A higher value indicates a greater importance; Pearson’s R = 0.995; significance = 0.000
Average Importance based on interest in purchasing wines made from grapes grown in a vineyard with cover crops to control weeds

A higher value indicates a greater importance; Pearson’s R = 0.995; significance = 0.000
Average Importance based on interest in purchasing wines made from grapes grown in a vineyard with cover crops to control weeds.

Arrows show changes in Average Importance compared to the overall Conjoint Analysis.

A higher value indicates a greater importance; Pearson’s R = 0.995; significance = 0.000.
In conclusion:

• Conjoint Analysis revealed that price accounted for over half (57.40%) of the purchasing decision
  • two lowest retail base prices ($12.00 and $16.00) received positive utility ratings

• When segmented by interest in minimal use of insecticides/herbicides and use of a cover crop, average importance for price was still higher than the other attributes
  • Even for those very/extremely interested in these “environmentally friendly” practices

• As level of interest increased average importance for price decreased
Thank you! Grazie! Any questions?

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Penn State Wine & Grape U. Blog: