

# GRAPE SEED OIL RESEARCH PROJECT FOR SUSTAINABLE VITICULTURE

Presented To:

Iowa Wine Growers Association

By:

Doug Grave

President, Western Iowa Grape  
Growers Association





# Background

- ▣ 2010 Loss of market share by grape growers
- ▣ Competition with out-of-state grapes
- ▣ “Squeeze” additional value added products from Iowa grapes.
- ▣ 2011 NCR SARE Grant
  - **Evaluating Value Added Grape Seed Oil Research Project for Sustainable Viticulture**
  - **Project Number: FNC12-859**



# Goals

- ▣ Determine feasibility of producing Grape Seed Oil (GSO)
  - Individual Winery
  - Regional Cooperative
- ▣ Produce a new value added product from Iowa grapes
- ▣ Increase the value of Iowa grapes
- ▣ Increase the sustainability and growth of Iowa vineyards and wineries



# Participants

- ▣ Pomace Provided by:
  - Prairie Crossing (Andy & Julianna Hrasky)
  - Vine Street Cellars (James Gapinski & Ralph Asam)
  - Victorian Vineyards (Doug & Brenda Grave)
  
- ▣ Pomace Processed by:
  - Bodega Victoriana (Doug & Brenda Grave)



# Grapeseed Oil Health Benefits

- ▣ rich in nutrients, especially antioxidants and fatty acids like linoleic acid.
- ▣ nutritional components in grape seed oil provide a variety of healthy benefits, one of the most important being their ability to slow down and reverse free radical damage and reduce the risk of disease, especially heart disease, and slow skin aging.
- ▣ Grape seed oil is a powerful antioxidant, 50 times more potent than Vitamin E and 20 times more effective than Vitamin C in destroying these free radicals, harmful molecules that roam the body and damage cells.

# Grapeseed Oil Culinary Benefits

- ▣ Its light taste brings out the flavor of food, while its high smoke point (485 degrees/F) lets you fry, bake or sauté without smoking, splattering or burning.
- ▣ Its delicate, nutty flavor makes delicious light salad dressings and an ideal substitute for butter, margarine, and other saturated fats. In fact, Grape seed oil offers one of the highest concentrations of heart healthy mono and poly-unsaturated fats of any vegetable oil, and the lowest levels of saturated fat of ANY oil.
- ▣ Grapeseed Oil is an excellent source of Vitamin E, an important antioxidant, and is 75% Essential Linoleic Acid, also known as Omega 6.

# POMACE PROCESS

1. Dry Pomace (or not)
2. Separate seeds from skins
3. Dry seeds
4. Extract oil



# Dry Pomace (or not)

- ▣ Solar drying not feasible
  - Skins are difficult to dry (especially white pomace)
  - Mold
  - Volume of material
  - Decreases seed volume (white pomace)
  
- ▣ Mechanical drying adds production costs
  
- ▣ Separate seeds/skins then dry

# Seed/Skin Separation

- ▣ Manual (individual winery)
  - Hand-made screen (low cost)
  - Holds down costs but increases labor
  - Appropriate for individual winery
  - 1 hour labor per ton (2 workers)
  - 5 tons per weekend is manageable
  - 90% separation achieved



# Seed/Skin Separation

- ▣ Automated (regional cooperative)
  - Repurposed Seed Cleaner (trommel)
    - ▣ Widely available throughout midwest
    - ▣ Used \$2K to \$15K
    - ▣ .047" inner screen/ .035" outer screen
    - ▣ Change pulley to reduce rotation speed
  - Significant reduction in labor
    - ▣ 20 min per ton (1 worker)
  - 95% separation achieved



# Dry Seeds

- ▣ 3 Step Drying Process
  - Solar Drying
    - ▣ 60% to 80% moisture following separation
    - ▣ Seeds spread out on tarps (1/2 in deep)
    - ▣ 30% moisture after 2 days in sun
    - ▣ Need cooperative sunshine
  - Cement Mixer/Leaf blower
    - ▣ Removes remaining 10% skins
    - ▣ Reduces moisture a few degrees



# Dry Seeds

- ▣ 3 Step Drying Process
  - ▣ 60 gallon barrel/Grain Bin Dryer
    - ▣ Dryer placed inside barrel and seeds placed around it
    - ▣ 2 days to achieve 15% moisture (safe storage)
    - ▣ Barrel placed in direct sunlight speeds process
    - ▣ Quality Grain Moisture Tester is critical





# Extracting GSO

- ▣ 3 Current methods
  - Chemical
    - ▣ Easiest and most widely used method
    - ▣ Uses a chemical called Hexane
    - ▣ Produces a lower quality, inexpensive oil
  - Hot Press (expeller)
    - ▣ Large industrial scale
    - ▣ Seed is heated to over 200 degrees Celsius
    - ▣ Nutrients, beneficial acids and unique flavor lost
    - ▣ Heavily filtered



# Extracting GSO

- Cold Press (Expeller)
  - Definition: Oil mechanically produced (expeller) with no external heating and seed/oil not exceeding 125F.
  - Why Cold Press? Delicate oils, or those in which flavor nuances are a key component or maintaining the highest nutrient value is important, need to be treated with greater care.
  - Most difficult method
  - Produces the highest quality oil
  - Dark green, nutty flavor
  - Ultra-Premium market



# Extracting GSO

- ▣ Grapeseeds are very difficult to press
- ▣ Very hard seed and low oil content (10% - 16%)
- ▣ Don't trust YouTube videos
- ▣ All presses can press grapeseeds for a short amount of time (5, 10, 30 min). Can they press 7/24?
- ▣ Choose a press company that has direct experience with grapeseed (or other low oil content seed) and stands behind their product.



# Extracting GSO

- ▣ Oil Press Company ([www.oilpress.co](http://www.oilpress.co)) Model M-70
  - They stand behind their product!
  - Did not work out of the box
  - 18 mon product development partnership
    - ▣ Increased nozzle size
    - ▣ Ball bearings
    - ▣ Re-engineered crushplate (for low oil content seed)
    - ▣ Larger motor

# Extracting GSO

- ▣ Lessons Learned:
  - Pre-heating press (<125F)
  - Harley Chrome (shiny parts = less friction)
  - Soybeans are your friend
  - 10% seed moisture (floor)





# Extracting GSO

- ▣ Production Numbers
  - Pomace is 25% of whole grapes (570lbs per ton)
  - Seeds are 5% of whole grapes/20% of pomace
  - 70 to 90 lbs of seeds per ton of whole grapes
  - 2 liters oil per ton of whole grapes
  - 1.5 liters per hour
  - 36 liters/9 gallons per day
  - 1260lbs seed per day/37,800 lbs per month
  - 540 tons (whole grapes) per month = 1080 liters



# GSO Market

- ▣ Chemical & Hot Pressed GSO
  - \$8 - \$15 per liter
  - Nutrient loss
  - Unique flavor lost
  - Consumer awareness (marketing challenge)
- ▣ Cold-Pressed GSO
  - \$20 - \$35 per 250ml
  - Smaller market (Chefs, Health and Beauty conscious)
  - Winery produced GSO commands premium price



# Individual Winery

- ▣ Average Iowa Winery produces 5000 gallons
- ▣ 33 tons whole grapes
- ▣ Produces 66 liters GSO (2 liters per ton)
- ▣ 264 bottles (250ml) = \$5280 retail (\$20 bottle)
- ▣ 3 man hours per ton (separating, drying, extraction) x \$10 hr = \$30 per ton
- ▣ Bottles/labels/utilities/taxes further reduces profit (Cost \$20 per ton)
- ▣ \$50 labor/bottles/labels per ton to produce \$160 retail product ( $\$160 - \$50 = \$110$  profit)



# Individual Winery

- ▣  $\$110 \text{ per ton} \times 33 \text{ tons} = \$3630 \text{ profit}$
- ▣ \$10K Entry cost (Press, dryer, moisture meter, handscreen, tarps, buckets, etc)
- ▣ \$3.5K annual profit = 2.85 yr break even
- ▣ Most labor occurs during off-peak season
- ▣ Modest supplemental income



# Regional Cooperative

- ▣ 10 participating wineries (330 tons whole grapes)
- ▣ 2,640 bottles (250ml) = \$52,800 retail (\$20 bottle)
- ▣ 1 man hours per ton (separating, drying, extraction) X \$10 hr = \$10 per ton
- ▣ Pick-up/delivery of pomace to processing facility (cost varies based on # tons picked-up and round trip distance. (\$20 per ton estimated)
- ▣ Bottles/labels/utilities/taxes further reduces profit (Cost \$20 per ton)
- ▣ \$50 labor/pick-up/bottles/labor per ton to produce \$160 retail product (\$110 per ton profit)



# Regional Cooperative

- ▣  $\$110 \text{ per ton} \times 330 \text{ tons} = \$36.300 \text{ profit}$
- ▣ \$20K Entry cost (Press, dryer, moisture meter, automated trommel screen, macrobins, tarps, buckets, etc)
- ▣ \$36K annual profit = 1<sup>st</sup> year profit



# Iowa GSO Potential

- ▣ 360,000 gallons of wine produced in 2012
- ▣ About 50% from Iowa Grapes
- ▣  $180\text{K}/150\text{g}$  per ton = 1200 ton of Iowa Grapes
- ▣  $1200\text{ tons} \times 8\text{ bottles (250ml)}$  = 9600 bottles of Grapeseed Oil valued at \$192,000
  
- ▣ If all Iowa wine was made with Iowa grapes = 19,200 bottles of Grapeseed Oil valued at \$384,000!



# Next Steps?

- ▣ Loess Hills Grapeseed Oil Cooperative
- ▣ Additional Value Added Products
  - Grapeseed Presscake
    - ▣ Highly valued for health benefits
    - ▣ Dietary supplement
    - ▣ Baking ingredient (extends shelf life)
    - ▣ 60lbs (after oil is extracted) per ton whole grapes



# Questions?

“No wine region in the history of the world has become famous or successful by making wine from the grapes of some other region!”

Doug Grave, President, WeIGGA