

# MARKET OPPORTUNITIES FOR OHIO GRAPE PRODUCTION

There are an estimated 2000 acres of grapes grown in the state of Ohio that supply primarily two markets. The majority of grapes produced (1280 acres) are used for processing into grape juice. These grapes are primarily of the variety Concord and are marketed almost exclusively to Welch's, Inc. Wine grapes are produced on approximately 600 acres in Ohio and are used almost exclusively for local wine production. (1)

Ohio's 2005 grape harvest will be bigger and more valuable than ever. Ohio farmers will harvest 25 percent more grapes in 2005 compared to 2002, and the value of these grapes has jumped from approximately \$2.3 to \$3.4 million - a 44 percent increase, according to the USDA's Economic Research Service forecast. (2)

The largest portion of juice grape acreage in the US is planted to the native Concord and Niagara varieties. These varieties are primarily produced in four states: Michigan, New York, Pennsylvania and Washington. Ohio ranks 5<sup>th</sup> in concord production US wide.

## PRODUCTION OF JUICE GRAPES BY STATE, 1998-2002

STATE	1998	1999	2000	2001	2002
Michigan	67,500	71,500	83,600	26,000	29,200
New York	87,000	152,000	111,000	107,000	109,000
Ohio	5,000	7,500	6,400	4,700	4,500
Pennsylvania	41,500	74,000	46,000	48,500	45,900
Washington	152,000	195,000	175,000	183,000	217,000
Others	250	2,050	2,250	650	2,200

US Total                      353,250    502,050    424,250    369,850    407,800

In the US wine market, Ohio is one of the top 10 wine-producing states with more than 500,000 gallons produced every year. Ohio's grape portfolio now includes vinifera, the type of grape from which Cabernet Sauvignon, Cabernet Franc and Riesling wines are made. Nationally, Ohio ranks sixth in the production of wine, fourth in the number of wineries and eighth in grape production. (4)

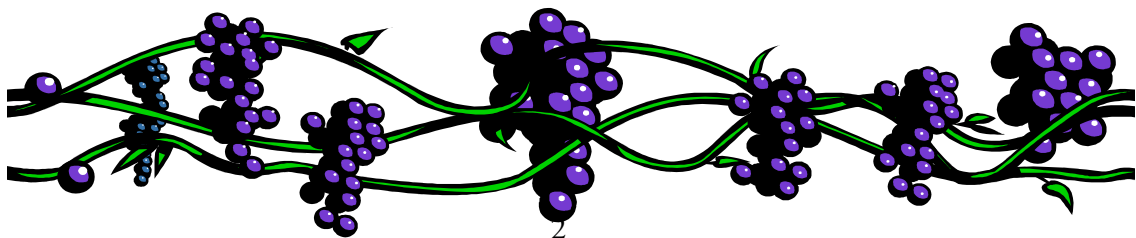
Ohio grape producers are facing a number of challenges that threaten the retention and expansion of grape acreage. These challenges include (but are not limited to):

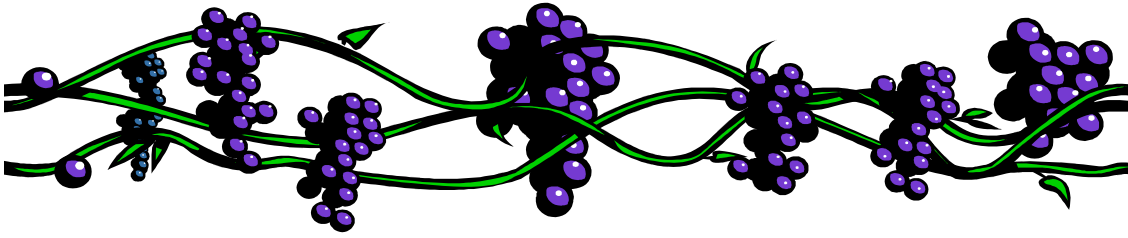
- Economics of vineyard establishment and grape production. The establishment of a commercial vineyard requires a substantial capital investment.
- Shifts in the distribution of grapes for juice production (from eastern US to west)
- Demand loss for juice grapes (*American Varieties*)
- Current high inventories of juice grapes and low prices (nationally)
- High demand for *Vinifera* grapes used in wine production that exceeds local supply
- Developmental pressures shifting grape acreage to residential and commercial uses

The purpose of this analysis was to identify potential new product offerings for Ohio grape production. This report is intended to aid producers in their strategic planning efforts by generating product ideas, developing preliminary market data and production information. New products evaluated included: grape seed oil/extract, vinegar, juice, and grappa (distilled spirits). A summary of each product is provided in this report.

Producers who are interested in learning more about these products and processes should contact:

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## GRAPE SEED OIL & EXTRACTS

Oil and extract (cake) processing can expand the use of crops and bring added value to seeds, which are often waste products. (5) Pressing whole red or white grapes into wine or juice involves, in most cases, only one extraction (by the juice) of the seeds and skins. After the primary extraction for juice there are soluble components that have considerable value remaining in the pressed pomace such as sugar, alcohol, organic acids, salts, minerals, antioxidants, and oils. Salvaging and developing profitable markets for by products can reduce overall operational costs and discharge into landfills. (6)

There are several potential uses for grape seed oil or grape seed extract (cake). Some of these include:

- Specialty oils for cooking
- Cosmetics (additives)
- Nutraceuticals (dietary supplements)

Seed collection and management practices are similar for both grape seed oil and grape seed extract. The most important aspect of seed management is *drying, separation and storage*, which can have a dramatic effect upon the potency and viability of seeds as well as the extracted product. (7)

Ideally, seeds used to manufacture grape seed extracts would be processed right away, that is separated from the macerated skin and immediately subjected to the extraction process. Grape seed pomace has high moisture content and is highly perishable. The potency of seed is maintained by rapid processing to keep them from becoming fermented. But as a practical matter this may not be possible.

The extraction process for oil involves three steps: extraction, clarification and packaging and storage. Extraction can be accomplished using either solvents or through mechanical means. There are two primary methods of mechanical extraction; oil presses and oil expellers. Oil presses range from small, hand driven models that an individual can build to power driven commercial presses. The extraction process can occur with or without heat. Cold extraction methods include cold pressing and vacuum extraction. Cold pressed oils retain all of their flavor, aroma and nutritional value. The heat extraction methods include solvent extraction and expeller processes. Expeller pressing is like cold pressing except that extreme pressure is added during the pressing. As much pressure as 15 tons per sq in is used to squeeze the oil from the fruit or seeds. The high pressure also produces high heat (as high as 300F) through friction, so the oils produced with the expeller process cannot be considered cold pressed. The oils obtained with this method retain much of the flavor aroma and nutritional value but not to the extent of cold pressed oils. (7) Clarification removes contaminants, such as fine

pulp, water, and resins. The use of clean dry containers to package and store oils is recommended to help prevent rancidity. Sealed glass or plastic bottles are adequate. Colored containers in a dark box will help to increase shelf life. The shelf life of oil is usually 6 to 12 months, if it is properly packaged and kept away from heat and sunlight.

(8)

The primary challenge for producers interested in processing grape seeds in Ohio is the limited amount of raw material (grape seeds) available for processing. Producers interested in a seed processing operation can reduce start up cost through sub contracting with an existing facility (see references for sub contractor contacts). Oil processing facilities exist that will process and package seeds for producers until product markets can be established to justify the cost of investing in facilities and equipment.

## GRAPPA

Grappa, in strict technical terms, is a brandy. It is distilled from grape pomace, skins, stems and seeds (all by-products of the winemaking process). Measuring 40-50% alcohol by volume, it is as clear as water and seldom aged for long periods of time. Most wineries in Ohio recycle pomace as fertilizer for use in the vineyard.

There is virtually no official and reliable statistical data available on the volume of grappa production and trade worldwide. The few statistical data that does exist typically contain aggregate data on all alcohol imports and exports, without specifying data for individual types of spirits. However, several news reports on the subject stated that Italy produces some 40 million bottles of grappa per year, compared to a mere 30,000 bottles produced by South Africa.

Grappas of high quality are produced from grapes with a higher ratio of acid content. Thus, northern cooler Italian regions are generally better suited for grappa production. Historically, the best known grappas come from distilleries located primarily in northern Italy, at the foothills of the Italian Alps. The primary locations of Italian grappa production are the regions of Friuli, Veneto, Alto Adige, Trentino and Piedmont. Nevertheless, even southern regions of Tuscany, Umbria or Sicily are known for high-quality grappa. The microclimate of the vineyard is what is the determining factor in quality.

There are as many grappa varieties as there are grapes. From grappa cabernet to grappa sangiovese, barbera and moscato to grappa chardonnay. In the US, grappas u'e and eau-vies come from vineyards in California, Oregon, Washington and most recently Iowa. Producers include; Bonny Doon, Mosby, Creekside, St. George Spirits, Domaine Charbay, Clear Creek Distillery, Korbel, Sebastiani, and Germain-Robin. Prices vary as widely as those of wine and can run from a modest \$18 to a high end \$80 and up.

The main substance used in grappa production is **pomaces**, i.e. skins of grapes pressed during wine production. Pomaces delivered to the distillery can be of three varieties, depending on the degree of their fermentation: pure (from white wines); half-fermented (from rosato); and fully fermented (from red wine). During the production, fruit sugar is transformed into high-percentage alcohol in two major steps: (1) pressing & fermentation and (2) distillation.

Fermented pomace is particularly suitable for the production of pomace brandy as it is soft and dry and has high alcohol content. Both semi-fermented and virgin pomace need to be kept in silos until fermentation is complete. After fermentation is complete, the pomace is pressed and the resulting pomace wine is distilled. Freshness and quality of the pomace is essential to the eventual quality of the grappa.

Northern Ohio's cooler climate may compare to the northern cooler Italian regions, which have been identified generally as being better suited for grappa production. Grappas of high quality are produced from grapes with a higher ratio of acid content, (northern cooler Italian regions) and this might prove a production advantage for northern Ohio growers interested in grappa production.

Challenges for Ohio wineries in grappa production would include; raw material availability, handling and marketing.

## WINE VINEGAR

The name vinegar comes from the Latin word vinum for wine and acer for sourness or sharpness. The dictionary defines vinegar as "sour wine" or "a sour liquid obtained by acetic fermentation of dilute alcoholic liquids and used as a condiment or preservative." Vinegar is one of the oldest products of fermentation used by man. (9)

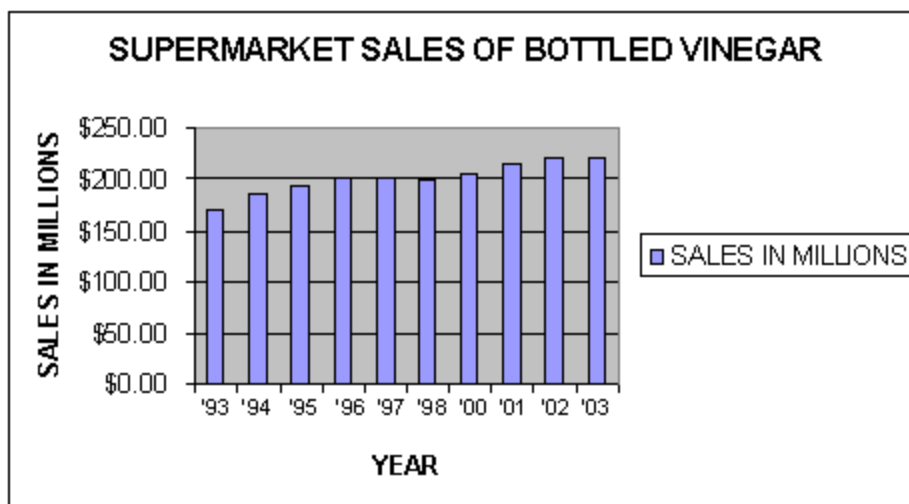
Vinegar is the product of a mixed fermentation of yeast followed by acetic acid bacteria on an alcohol substrate. The vinegar process essentially occurs in two-stages. The first process is called alcoholic fermentation and occurs when yeasts change natural sugars to alcohol, under controlled conditions. With grapes the result of alcoholic fermentation is wine. In the second stage, a group of bacteria (called "Acetobacter") converts the alcohol to acid. This is the acetic, or acid fermentation. It is the acetic acid produced by the fermentation of alcohol that gives the characteristic flavor and aroma to vinegar.

Although acetic acid is the primary constituent of vinegar aside from water, acetic acid is not vinegar. Vinegar contains many vitamins and other compounds not found in acetic acid such as riboflavin, Vitamin B-1 and mineral salts from the starting material that impart vinegar with its distinct flavor.

The basic requirement for vinegar production is a raw material that will undergo an alcoholic fermentation. Many raw materials are used including; apples, grapes, pears, raspberries, rice and malts. When white or red wine is used as a base, the vinegar, pending on the taste of the base product, will taste like the grape variety from which it was derived.

Wine vinegars can be red or white and there is a considerable range in quality. Fine vinegars come from fine wine, and are made the slow, traditional way in oak barrels. They are matured in wood for periods ranging from a few weeks to one to two years. Red wine vinegars are aged longer than those made from white wine. The very best wine vinegars are made in relatively small batches, have fine balance and subtle, complex flavor. They are characteristically rich and mellow.

Although bottled vinegar sold at retail makes up a large part of the vinegar market, vinegar is also a key ingredient in a number of familiar products. Vinegar adds flavor and



*Source: Yearly July or September issue of Progressive Grocer Magazine (part of Bill Communications in New York) that tracks sales of supermarkets having sales of \$2 million or more. Progressive Grocer revised base dollar sales volumes in 1999, but the percent changes were not affected. 1999 sales of vinegar were not broken out by Progressive Grocer.*

zip to salad dressings, sauces, marinades, ketchup, mustard, pickles, tomato products and more.

Grain and apple cider vinegars are most commonly used in the United States, while in Latin America, the vinegar distilled from the sugar cane alcohol is predominant. In Japan and other Asiatic countries, the rice vinegar tops the list, while the Europeans are most likely to use wine vinegar. In Europe, there is a growing market for high price vinegars made solely from specific fruits (as opposed to non-fruit vinegars that are infused with fruits or fruit flavors)

According to AC Nielsen, vinegar sales growth at 15% has been stronger from 2000 – 2002 than most other comparative categories including meat marinades, oriental sauces, Worcestershire sauce and cooking wine and sherry. Stronger dollar sales appear to have contributed to this growth due to higher-end products in the category. According to the Supermarket sales data, vinegar sales increased 29% from 1993 to 2003. Growth is also evident by the number of vinegar items on the average grocery store shelf. In 1998 the average number of vinegar items on the grocery store shelf was 29, an all time high compared to 27 in 1994. Consumers today have more choices.

Wine vinegars have considerable range in quality and price. Red wine vinegars are aged longer than those made from white wine. The very best wine vinegars are made in relatively small batches, have fine balance and subtle, complex flavor. They are characteristically rich and mellow. Specialty Wine Vinegars (those that are produced from a specific grape variety) generally command the highest price. A new specialty wine vinegar of particular interest is the Minus 8 brand. This grape vinegar has been on the market since 2001 and it is named for the temperature at which the grapes are picked and made the same way as ice wine. It is marketed as a rare & limited culinary specialty item to top chefs.

Vinegar production is essentially a two-stage process. The first process is called *alcoholic fermentation* and occurs when yeasts change natural sugars to alcohol under controlled conditions. In the second process, a group of bacteria (called “Acetobacter”)

converts the alcohol portion to acid. This is the *acetic, or acid fermentation* that forms vinegar. Proper bacteria cultures are important; timing is important; and fermentation should be carefully controlled. Equipment and supplies are readily available for vinegar production.

Market and consumer data indicate that vinegar sales growth has been strong and growth in red wine vinegar and balsamic vinegar appear to be driving the increase in sales. The increase in demand for higher end wine vinegar products, such as the Minus 8 brand, would indicate a potential market opportunity for wine grape growers who might want to diversify their product offerings.

The primary challenge to wine vinegar production in Ohio is the limited availability of locally produced wine grapes due to the demand for locally produced wines.

## GRAPE JUICE

A grape juice product with a unique flavor profile, or one where no preservatives are added, would expand the grape juice market for local producers. Newer food processing technologies may offer opportunities in the development of “new” grape juice products.

A study completed in 2005-2006 in partnership with EISC – Center for Innovative Food Technology, Ohio State University, and Firelands Winery, Sandusky, Ohio evaluated pulse electric field (PEF) and high-pressure processing (HPP) to determine if they were viable technologies in processing grape juice. The objective of the study was to evaluate what effect these technologies might have on taste, quality, safety and consumer acceptance.

Preliminary results of the study showed that it is possible to process grape juice using high-pressure processes (HPP) and pulse electric field (PEF) without physically altering the product to the extent that it was not drinkable. The value of these technologies for producers would be in the potential to develop a grape juice product with no preservatives.

Because the use of preservatives in grape juice is complex and involves preservatives other than sulfur i.e.) potassium sorbate, additional research on the affect these processes have on both preservatives is needed to guarantee a product that is both safe and of high quality.

## RESOURCES

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