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WINE PROCESSING IN SANGLI DISTRICT OF MAHARASHTRA

Dr. Adinath Gade

ABSTRACT

The present paper an attempt is made to study the wine processing in Sangli district. Wine making is one of the well known and ancient fruit processing activities. All over the world wine is produced and consumed. Grape wine making is gradually picking up in Sangli district since last ten years. At present, there are 17 wineries in the district and production capacity is over 208 million gallons of wine per year. Sangli districts accounting the largest share wine production in the state. For present investigation primary and secondary data is obtained from field work and Socio-economic review and district statistical abstract of the Sangli district.

KEYWORDS: Wine, Destemming and crushing, Drain and pressing, Fermentation, Clarification and stabilization, Aging,



Racking, bottling etc.

INTRODUCTION :

Wine is an alcoholic beverage made from fermented grapes or other fruits (Johnson, 1989). Wine making is one of the most well known and ancient fruit processing activities (Leong et. al, 1972). The science of wine and wine making is known as oenology also known as vinification. All over the world wine is produced and consumed. "Wine is an alcoholic beverage obtained from fermented grape juice (Karibasappa et. al, 2010). Wine is not only made from grapes, it is made from various fruits and grains, such as apples and berries, are usually named after the

fruit from which they are produced combined with the word "wine" and are generically called fruit wine or country wine (Eisenman, 1998). Wine makers have developed special techniques for use with different grapes and in different geographical locations. Wine making is therefore often considered more of an art than a science. But it is also a seasonal undertaking. Production can only take place within a limited period, due to the condition of the grapes. The equipment used for wine making must therefore be extremely efficient and highly reliable in order to ensure continuous processing during this

limited period.

Sangli is the major quality grape growing area in Maharashtra (India) and off late many farmers are cultivating grapes of wine variety (Gade & Gaikwad, 2014). At present, there are 17 wineries in district and that production capacity over 208 million gallons of wine per year. Sangli region is second largest wine producer region in the Maharashtra, after Nashik district, accounting the largest share of wine production in the state. In the present paper an attempt is made to assess processing method of wine in Sangli district.

STUDY REGION

The study region selected for present investigation is Sangli district of the south Maharashtra plateau. It is situated in the river basins of the Warna and Krishna river. It lies between 16o 45' North to and 17o 33' North latitude and the 73o 42'

East and 75o 40' East longitude, covering an area of 8610 Sq. km with 2820575 population (Censes, 2011), which constitute 2.51 per cent of state population. It is bounded by Solapur and Satara districts in the North, Bijapur district in the east, Kolhapur and Belgaum district in the south and the Ratnagiri district to the West. The soil vary from laterite patches in the west to deep medium black alluvial of river tracts in the central part and further to poor gray soil in the east. The climate of the district is generally dry. In general the rainfall was decreases from west to east from 2000 mm to 500 mm. From central part to eastward the region faces severe drought conditions. The average annual rainfall of the district is 618.66 mm, the temperature ranges from 14.800 C to 38.40 C.

OBJECTIVES OF THE STUDY:

The present study has examined the processing methods of wine in Sangli district of Maharashtra.

DATABASE AND METHODOLOGY:

The primary data has been collected through sample survey and personal interview. Sangli district were selected purposively, there are 17 wine industries in the Sangli district at the random 10 wine industry were selected from the study area. Primary data were collected from the selected wineries with the aid of pre-tested interview schedule. From the processor, details of information such as processing method and wine quality. The data pertain to the marketing year 2013-14.

WINE PROCESSING IN SANGLI DISTRICT

The Sangli district has recently entered into wine industry. It has achieved some success in producing classic vintage categories. Grapes from Sangli district are more suited for wine production. The fertile soil of the Sahyadri hills region, and the long sunny days and dry climate make for an excellent product. Grape wine making is gradually picking up Sangli district. Realizing the potential of this industry, the Maharashtra Industrial Development Corporation (MIDC) has established wine parks under the "Food Park" scheme of the Ministry of Food Processing Industry of the Govt. of India viz. at Palus near Sangli known as "Krishna Grape Wine Park".

There are around 17 wine producing units in the study region. Market for wine is continuously growing in India and abroad. A small winery can be started with an investment of around Rs. 20 lacs. Required know-how (wine makers) and machinery are available locally.

WINE GRAPES AVAILABILITY IN SANGLI DISTRICT

Although 30002.69 hectors of land is under grape cultivation in Sangli district. Wine grapes account for less than 300 acres currently. The wine varieties yield about 8-12 tons per acre with an average of 10 tons against an average of 12-17 tons per acre for table grapes. For every 1 lack liter of wine produced 35 acres of vineyard. Zinfandel, Syrah or Shiraz, Poot noir, Merlot, Cabernet sauvignon, Barbea, Ola-cabernet, Amarso, Cabernet savlag, Vita etc varities are used for red wine and Sauvignon Blanc, Chardony, Chenin Blanc, Muscat, Riesling, Firrato etc used for white also Maverick, port-5 and Bangalore purple for port wine making in Sangli district. Wine industry of Sangli district was totally dependent upon local grapes and purchased from Baramati and Osmanabad of Maharashtra and Bijapur district in Karnataka. Some processor have developed own grapes it is not sufficient, the processor faced capacity constraints. All wine manufacture has promoted direct farmer linkages in order to enhance availability of wine grapes.

WINE PROCESSING

The wine-making process can be involved into five distinct steps: Sampling of grapes, harvesting, crushing of Grapes, fermenting must, ageing the wine and packaging. The steps involved in the processing of grapes into wine vary depending on whether the wine produced is to be white or red. White winemaking requires extracting the juice from the berries (skin and seeds are separated from the juice) as quickly as possible and transforming the grape juice into wine through a temperature-controlled fermentation. Red winemaking requires a period of maceration of the juice, skin and seeds to extract not only colour but also the tannins that will

contribute to the structure and body of the final wine (FAO, 2009).

Sampling of grapes

As the grapes approach the perfect maturity level, the vineyard activity shifts in preparation of harvest. First of all the sampling plan is done. In this the sampling dates will be decided based on the variety and pruning done on the same vineyard. Grapes berries should be fulfill with chemical composition.

Harvesting

It is a first step of wine production. Harvesting is the picking of the wine grape at their optimal level of maturity. Grapes are either harvested mechanically or by hand. Winemaker determine best time to harvest requires both experience and careful assessments of wine grape maturity. This is the most critical stage of the process. The decision of the harvesting, depending on level of sugar ($^{\circ}$ Brix), acid level, and pH of the grapes, color and taste of the grapes. Date of harvest is one of the most important decisions in wine production. This depends on the type of wine to be produced. For example, sparkling wine requires a higher acidity than still table wine. Initial stages once the grapes have been picked and transported to the winery, certain preparatory steps must be taken before the actual winemaking can begin. The grapes are transported to the winery by truck. At the winery, the grapes are received at a receiving bin or station.

Destemming and crushing

After harvesting, the Second step in winemaking comprises of de stemming and crushing the grapes. The destemming and crushing is done with specialized equipment. The object of destemming is handling harvested grapes is to separate the berries from the stems. After reception, the stems are removed from the grape berries and also the crusher punches the grapes and transfer it to a de-juicer which separates the pulp from the juice. Some wineries receive all or part of their grapes as juice, in which case, destemming and crushing have been done elsewhere. It is necessary to point out that crushing and mixing are done differently for white and red wine. The mixture of juice, skins, seeds and pulp is called must. The major difference between red and white wines is that, after destemming and crushing, the juice of the must for red wines is fermented on the skins for several days to extract their red pigments. In white wines, the mixture of juice, skins, seeds and pulp is pumped to the pressing stage. Shikarmany (2001) noted that in white wines only the clear juice is fermented to minimize extraction of tannins from skins and seeds whites. Unlike red winemaking, where you can crush the fruit and immediately begin the fermentation without any other steps or preparation, white winemaking requires carrying out a series of steps before the juice undergoes fermentation. In addition, the juice for white wine is more delicate and prone to oxidation. This means that it is less forgiving to technical mistakes, so special attention must be paid to protect it during processing. On average, white winemaking is more technical and less forgiving than red winemaking. In white wine production minimum damage to the skins is especially important to prevent the release of phenolic compounds from the skins. Maceration of the skins during crushing may also cause changes in the chemical composition of the juice which can have undesirable effects. The traditional method of mechanical destemming consists of having the crushing rollers located before the destemmer. However, if the stems are crushed, phenolic compounds can be released into the must, so, for some higher quality wines, destemming before crushing is preferred.



Photo Plate : 1. Destemming and Crushing Equipment

Drain and pressing

The process used to separate the liquid from the grape solids is called "pressing" (Eisenman, 1998). The crushed material is pumped into the tank, and the juice drains from the tank. If the juice does not naturally drain, a press is used to extract the juice. In many (larger) wineries a press will be the main way to extract the juice from the must. Both the speed and the pressure of the press affect the quality of the wine. Membrane presses are preferred. A motor operates the membrane presses and pumps and compressors are used to pump must and juice. One ton of grapes will yield 155 to 195 gallons of must, of which 120 to 160 gallons being free-run juice.

For red wine, after crushing, the must goes directly to the fermentation stage and pressing is done after fermentation. The skins give the wine its color; so leaving the skins, seeds and pulp in until after fermentation gives the wine a red, rather than clear color.

For white wine, skins, seeds and pulp are separated from the juice after crushing. This juice is called free run. The remaining skins, seeds and pulp are called the marc. Sometimes the marc is pressed first with a modern bladder type cylindrical press and then with a traditional basket press. White wines are made using only the juice from the fruit, the solids are not included. In order to separate the juice from the solid parts of the grapes, we must crush and press the grapes before the fermentation begins. On the other hand, removing the stems from white grapes is not necessary when the fruit is pressed immediately. Sometimes, not removing stems from white grapes is advantageous. The pulp of some white grape varieties is very slippery, and the slick pulp makes these varieties difficult to press. Varieties like Muscat Alexandria have slick pulp, and they are much easier to press if the stems are left in the must.

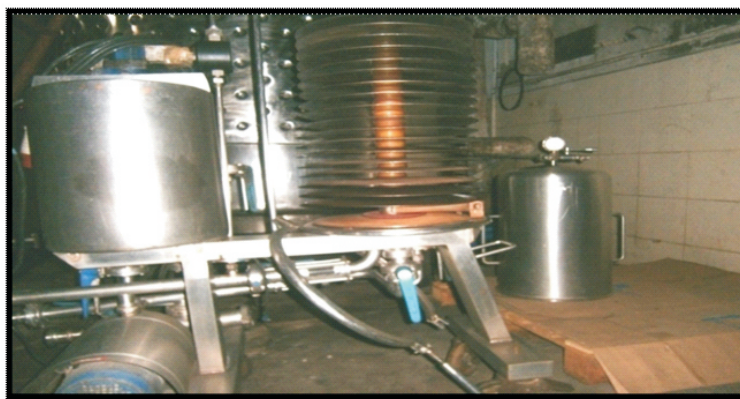


Photo Plate :2. Drain and Pressing

Fermentation:

Fermentation is an extremely important step in winemaking, determining taste and quality. The grape juice is first chilled in a combination of stainless steel tanks and oak barrels and then fermented by adding yeast. In fermentation yeasts convert the sugars to alcohol and carbon dioxide is called primary fermentation. Converting grape sugars into alcohol is not a simple process. Many steps are involved in this transformation, and the yeast must produce several different enzymes (Eisenman, 1998). Yeast in the wine produce enzymes, and the enzymes convert the sugars into alcohol. The species of yeast that is used to ferment grape juice into wine is *Saccharomyces cerevisiae*. The yeast *Saccharomyces* is responsible for the conversion of sugar to alcohol and plays a key role in the transformation of grapes into wine. The fermentation process takes place at a controlled temperature for quality purposes, to which the wine needs to be cooled at the beginning of fermentation and throughout the process. The temperature during the fermentation affects both the taste of end product as well as the speed of the fermentation. For red wine the temperature is typically 22 to 25° C, and white wines 15 to 18° C. The length of the fermentation period depends on the sugar content of the grapes and juice, and is controlled by the winemaker to optimize the quality of the wine. Fermentation is a process that takes place slowly over a period of ten to thirty days.



Photo Plate :3. Fermentation in Stainless Still Tank.

When some sweetness is desired, the fermentation is stopped while the desired amount of residual grape sugar remains. The first fermentation wine is further stored in tanks or oak barrels for 6- 8 months maturation.

Clarification and stabilization

The clarification and stabilization of wine in winemaking involves removing insoluble and suspended materials that may cause a wine to become cloudy, gassy, from unwanted sediment deposit or tartaric crystals, deteriorate quicker or develop the assorted wine faults due to physical, chemical or microbiological instability. Stabilization is carried out to remove traces of tartaric acid. These tartarates present in the grape juice tend to crystallize in wine and if not removed completely can slowly reappear as glass like crystals in final bottles on storage. Stabilization with respect to tartarates may involve chilling of wine that can crystallize tartarates and these crystals can be removed by filtration. When the liquid is removed from ferment or, it is not completely clear. The aim of stabilization is to convert malic acid into lactic acid thereby reducing the acidity and giving a smoother taste. These processes may include fining, filtration, centrifugation, flotation, refrigeration, barrel maturation, and racking maturation.

Filtration

Proper filtration results in the removal of insoluble solids and removal of microorganisms, assuring a microbiologically stable, bottled product. The role of filtration in wine making is to provide stabilization.



Photo Plate :4. Sheet Filter



Photo Plate : 5. Filter and Drain

Physical stabilization prevents the formation of hazes and deposits after packaging, while microbiological stabilization eliminates yeasts and bacteria that can destroy a wine's taste. Filtering out the contaminants that adversely affect stabilization occurs in primary, intermediate and final (terminal) filtration steps. Filtration can be performed based on two principles, depth filtration and surface or absolute filtration. Depth filtration, also known as sheet filtration involves the use of a relatively thick layer of a porous material such as Kieselguhr or diatomaceous earth, cellulose powder or perlite. It is good for liquids heavily laden with solid particles, such as juice directly from the press. As the wine passes through the layers, small particles are trapped in the tortuous channels.

In these reactions specific strains of bacteria convert malic acid into milder lactic acid, and results in the texture of the wine changing from crisp and light to creamier buttery.

Malolactic fermentation

The secondary fermentation is called malolactic fermentation. Malolactic fermentation has three distinct but interrelated effects on wine quality. It reduces the acidity, influences microbial stability and may affect the sensory characteristics of the wine. After the alcoholic fermentation, Malolactic fermentation can also take place, in this reaction specific strains of bacteria convert malic acid into milder lactic acid, and results in the texture of the wine changing from crisp and light to creamier buttery. This fermentation is often initiated by inoculation with desired bacteria. Malolactic fermentation can either be introduced, or may naturally occur. It is not an easily predicted reaction: it may begin immediately, or it may take months for the process to begin. The progress of malolactic fermentation is monitored with paper chromatography. The secondary fermentation usually takes place in either large stainless steel vessels with a volume of several cubic meters, or oak barrels, depending on the goals of the winemakers. Oak could be added as chips used with a non-wooden barrel instead of a fully wooden barrel. This process is mainly used in cheaper wine. Malolactic fermentation can improve the

taste and also increase the pH of the wine. Malolactic fermentation commonly occurs during the aging of red wines, and contributes to the mellowing of the wine

Aging

After the fermentation, wine needs to be stored, filtered, and properly aged. Aging is an important factor in assessing the value of wine. It could take months or years depending on the wine involved, the longer the aging process, the higher the value of wine. As the wine is aging, the grape solids (sediment) slowly settle to the bottom of the tanks. After various filtering processes, the wine is aged in stainless steel tanks or wooden vats. Most large wineries age their wine in large temperature-controlled stainless steel tanks that are above ground, while smaller wineries may still store their wine in wooden barrels in damp wine cellars. The aging tanks can be large or small, oak, redwood or stainless steel barrels. Aging allows oxygen to enter, and water and alcohol to escape. The acidity decreases, clarification takes place, and components of wine form compounds to enhance flavor and aroma. The wood also contributes to the flavor. In white wines, aging transforms lighter straw-colored wines into more deeply yellowed colors (Singleton and Kramling, 1976). In red wines, the initial blue red color anthocyanins are transformed into brick-red pigments. The amount of time that a wine is aged is equal to the time that elapses between the fermentation and drinking. White and rose wines may age for a year to four years, or far less than a year. Red wines may age for seven to ten years. Some red wines are aged up to forty years. During barrel aging, wines undergo a series of subtle yet fundamental changes in color and develop bouquet as the grape aroma of the young wine gradually fades. During this aging, the wine also clarifies and becomes stable.



Photo Plate : 6. Aging Wine in Oak Barrels

The final stage in vinification is aging the wine. At this point, the clarified wine is transferred into either wooden barrels or metal vats in which the wine is allowed to further mature and develop flavors. If a winemaker chooses to age the wine in wooden casks, he will be allowing the wine to pick up flavors from the wood, adding greater depth to its flavors. While this can add body to some wines, keep in mind that the “woody” flavor isn’t suited to all types of wine, hence the use of metal vats.



Photo Plate.7 :Aging Wine in Stainless Still Tank

Racking

During the aging, the wine must be drawn off periodically from the sediments and moved into a clean cask. This process is called “racking”. As the wine matures, many producers complete the aging in smaller oak barrels. Racking is carried out to separation of the remaining lees. Fermentation ends after the yeast has eaten all the sugars. At this point, the yeast dies and becomes sediments called lees and sits at the bottom of the vat.

Bottling

Bottling is the end process of winemaking. Once the mature wine is ready, it is stabilized through cold treatment. After testing the stability of the wine, it then is filtered to screen the balance fine particles. The filtered wine is then packed in bottles, which are washed internally and externally with double filtered water and air to remove bacteria and germs. Bottling is a delicate procedure, requiring absolute cleanliness to avoid spoilage. Special equipment is used to avoid causing damage to the wine.



Photo Plate :8. Automated Bottling Machines.

Once wine is bottled and corked, it continues to develop and age, each one at its own pace. Corks made of a special oak. The corks are covered with a peel-off aluminum foil or plastic seal. Cheaper wines have an aluminum screw-off cap or plastic stopper. The corks and screw caps keep the air from spoiling the wine. Producers often use different shaped bottles to denote different types of wine. Colored bottles help to reduce damage by light. (Light assists in oxidation and breakdown of the wine into chemicals, such as mercaptan, which are undesirable. Most wineries now use automated bottling machines.

CONCLUSION

Wine making is one of the well known and ancient fruit processing activities. Sangli districts accounting the largest share wine production in the state. The production of wine Started with selection of the grapes or other produce and ending with bottling the finished wine. The wine-making process can be involved into five distinct steps: Sampling of grapes, harvesting, crushing of Grapes, fermenting must, ageing the wine and packaging. Wine quality depends on many factors such as where the grapes were grown; when the grapes were picked; the acidity and the pH of the juice; fermentation temperature; skin contact time and other parameters and also wine grape maturity and it is specific in different varieties. The Sangli district has recently entered into wine industry. It has achieved some success in producing classic vintage categories. Grapes from Sangli district are more suited for wine production. Wine producers in Sangli make distinctive, classic wines using imported root stocks. This is a good product especially for some progressive farmers who are already in grape farming. The industry has good future prospects.

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