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ABSTRACT

The study was conducted to assess the quality management practices of fruit vinegar processors in Sablan and La Trinidad; to determine the perception or knowledge of fruit vinegar processors about quality; identify the production practices from the procurement of inputs until the desired product has been produced; quality management practices employed by fruit vinegar producers and determine the problems encountered with regards to processing and quality management.

Seven, 2 managers and 5 processors served as respondents in the study. Most of them were female, belonged to 46-55 of age, high school graduate, married and involved in processing in almost four to five years. Majority attended seminars and trainings to improve the quality of their product. The two businesses operated as cooperative and sole proprietorship.

The processing and location were safe to employees and customers. Majority of the raw materials were procured from other suppliers and had standards in selecting and establishing proportion of the raw materials. The variety of fruit that they were chosen was

Sweet Charlie for the strawberry, Saba for banana and any available variety for pineapple. The processors practiced 17 stages in processing fruit vinegar.

The fruit vinegar processors applied quality control tools in their business such as check sheets and brainstorming. Product quality was established and inspected before production and during and after processing or until the finished products were delivered to its designated market destination. Quality product assurance and quality standards has been set and applied. Problems and difficulties were encountered in material sourcing, development and processing of finished product and quality management.

INTRODUCTION

Rationale

The word vinegar is derived from the French words vinaigre, meaning sour wine. Vinegar is classified as acetic acid fermentation. It is produced via two-stage fermentation. The first stage is the anaerobic conversion of sugars into ethyl alcohol by the action of yeasts followed by the oxidation of the alcohol to acetic acid by Acetobacter bacteria. It is now one of the most widely used ingredients in the food industry, with worldwide production of 1 million L per year and the per capita consumption is 2 liters. In the past it has served a wide variety of functions, but today its use is largely confined to food flavoring, production and preservation (Pederson, 1967).

Vinegar is a versatile liquid that is created from the fermentation of ethanol. The key ingredient is acetic acid, which gives it an acidic taste, although there may be additions of other kinds of acid like tartaric and citric. The typical pH of vinegar ranges from 2 to 3.5, although the store-bought kind usually measures 2.4. In food preparation procedures, it is a multipurpose product as an ingredient and condiment. Outside of cooking, vinegar has medicinal, household cleaning, and agricultural applications.

Fruit vinegars are made from fruit wines, usually without any artificial flavor. Common flavor of fruit vinegar include apple, blackcurrant, raspberry, quince, and tomato. Typically, the flavor of the original fruits remains in the final product.

The banana fruit turns from deep-green to yellow or red, or, in some forms, green- and white-striped, and may range from 2 1/2 to 12 in (6.4-30 cm) in length and 3/4 to 2 in (1.9-5 cm) in width, and from oblong, cylindrical and blunt to pronouncedly 3-angled,

somewhat curved and hornlike. The flesh, ivory-white to yellow or salmon-yellow, may be firm, astringent, even gummy with latex, when unripe, turning tender and slippery, or soft and mellow or rather dry and mealy or starchy when ripe. The flavor may be mild and sweet or subacid with a distinct apple tone. Wild types may be nearly filled with black, hard, rounded or angled seeds 1/8 to 5/8 in (3-16 mm) wide and have scant flesh. The common cultivated types are generally seedless with just minute vestiges of ovules visible as brown specks in the slightly hollow or faintly pithy center, especially when the fruit is overripe.

Banana is the premiere fruit crop in the Philippines today and sometimes compared to coconut as the "tree of life" (PCCARD, 1988). The banana fruit can be eaten fresh, processed or cooked. As food, it can be processed as puree, jam, jelly, chips, flour, catsup, wine and vinegar (PCCARD, 1988). From 2005, the Philippines is producing more than 6 million metric tons of bananas a year putting Philippines to top 5 producing country to the whole world. Out of 80 cultivars of banana, Cavendish is produced specifically for export market (PCCARD, 1988). The Cavendish is a greenish-yellow fruit when ripe under normal temperature. The pulp is white to cream, fine-textured, and sweet. It is rich in vitamins and minerals (PCCARD, 1988). It is the second biggest cultivar produced next to Saba (PCCARD, 1988). It comprises almost 26% of total banana production. Based on the parameters set by the Bureau of Agricultural Statistics (2008), 6% of the banana produce is turned into feed and waste. Therefore, approximately 93,000 metric tons of Cavendish goes into feed and waste.

Due to the seasonality of the fruits, entrepreneurs seek ways for them to be able to prolong the life span of these seasonal fruits. This idea leads them to the development of

fruit vinegars. Some of these enterprising entrepreneurs who have found money-making venture on these seasonal fruits is the Kayabang Multipurpose Cooperative which is producing pineapple and banana fruit vinegar, and one also, the Julio and Julia's Food Products is producing strawberry cider vinegar.

Importance of the Study

The result of the study will serve as an instrument to encourage and further develop the fruit vinegar processing business. It will also provide insight to researchers, processors in developing new product for a successful business project which would be their competitive advantage over other fruit vinegar producers.

REVIEW OF LITERATURE

Vinegar History

Vinegar is the world's oldest cooking ingredient and food preservation method. According to the Vinegar Institute vinegar's use can be traced back over 10,000 years. In fact, flavored vinegars have been manufactured and sold for almost 5,000 years (Vinegar Institute, 2005).

The use of vinegar to flavor food is centuries old. It has also been used as a medicine, a corrosive agent, and as a preservative. In the Middle Ages, alchemists poured vinegar onto lead in order to create lead acetate. Called "sugar of lead," it was added to sour cider until it became clear that ingesting the sweetened cider proved deadly.

During the Renaissance era, vinegar-making was a lucrative business in France. Flavored with pepper, clovers, roses, fennel, and raspberries, the country was producing close to 150 scented and flavored vinegars. Production of vinegar was also burgeoning in Great Britain. It became so profitable that a 1673 Act of Parliament established a tax on so-called vinegar-beer. In the early days of the United States, the production of cider vinegar was a cornerstone of farm and domestic economy, bringing three times the price of traditional hard cider (Anonymous, 2001).

Requirements and Restrictions of Vinegar

According to Michigan Company Laws Section 289.8111(2012), there are some requirements and restrictions of vinegar processing which are as follows: (1) A person shall not manufacture for sale, offer or expose for sale, sell or deliver, or have in his or her

possession with intent to sell or deliver, any vinegar not in compliance with the provisions of this chapter; (2) The word "vinegar" as used in this section is limited to a water solution of acetic acid derived by the alcoholic and subsequent acetous fermentation of fruits, grain, vegetables, sugar, or syrups and if not distilled must carry in solution the extractive matter derived solely from the substances indicated on the label as its source; (3) Vinegar shall not be sold or offered for sale as apple or cider vinegar which is not the legitimate product of pure apple juice. The term "cider vinegar" or "apple cider vinegar" as used in this section means vinegar derived by the alcoholic and subsequent acetous fermentation of the expressed juice of apples, the acidity, solids, and ash of which have been derived exclusively from apples and which contains not less than 4% of absolute acetic acid. Cider vinegar which, during the course of manufacture, has developed in excess of 4% acetic acid may be reduced to a strength of not less than 4%, and cider vinegar so reduced is not regarded as adulterated; (4) Every manufacturer or producer of cider vinegar shall plainly label on the head of the cask, barrel, keg, or other container of such vinegar, his or her name, place of business, and the words "cider vinegar" or "apple cider vinegar". A person shall not mark or label vinegar a as cider or apple cider any package containing that which is not a cider vinegar. Any vinegar sold or offered for sale shall be marked or labelled plainly upon the package or container from which it is sold and also on the original package or container in which it is sold or delivered, in a manner that shows its true character and source; (5) Vinegar sold or offered for sale as sugar vinegar shall be strictly and distinctly fermented from sucrose, molasses, refiner's syrup, or nutritive carbohydrate sweetener; (6) Vinegar sold or offered for sale as malt vinegar shall be strictly and distinctly fermented from malted barley, cereals, or a concentrate of malted barley or cereals, which has been

enzymatically converted by the malting process; (7) Vinegar shall not be sold or offered for sale in which foreign substances, other than substances permitted under this act, drugs, or acids have been introduced. Vinegar shall not contain any artificial color except as permitted under this act. Vinegar shall contain not less than 4 grams of acetic acid per 100 cubic centimeters at 20* centigrade. If vinegar contains any artificial substance, except as permitted under this act, or contains less than the required amount of acidity, it shall be considered to be adulterated; (8) Vinegar made by fermentation and oxidation of the juice of grapes or the acetous fermentation of wine, without the intervention of distillation, shall be labeled with the name of the fruit or substance from which the vinegar has been made; (9) Vinegar made by acetous fermentation of dilute distilled ethyl alcohol shall be labeled "distilled vinegar", "white distilled vinegar", "distilled white vinegar", or "white vinegar". Vinegar, except flavored vinegar and blended vinegar, made in part from distilled vinegar shall be conspicuously labelled "distilled vinegar" and shall have the component vinegars declared in the ingredient statement; (10) Flavored vinegar shall be labelled "_____ flavored vinegar". The space shall be filled in with the name of the characteristic flavor. All of the words in the name shall appear on a background of contrasting color. The flavor name shall be in letters at least 1/2 the size of the letters in the word "vinegar". The word "flavored" shall be in letters at least 1/2 the size of the letters in the flavor name; (11) Blended vinegar shall be labelled "blended vinegar" or "_____ vinegar", the blank to be filled in with a name which accurately describes the nature or function of the vinegar. All of the words in the name shall be in letters on a background of contrasting color; (12) As used in this section:(a) "Blended vinegar" means the acetous fermentation of a blend of raw materials or a blend of 2 or more of the vinegars defined in this chapter but not

including apple cider vinegar.(b) "Flavored vinegar" means vinegar to which garlic, shallots, chili, tarragon, herbs, or spices, or the extract of any of those substances, is added to impart a characteristic flavor.

Three Distinct Processes Involved in the Preparation of Vinegar

There are 3 distinct processes involved in vinegar processing which are as follows:

Alcohol fermentation. Fruit juices and sugar solutions of low concentration ferment of their own accord due to wild yeast normally present in the fruits and in the atmosphere but this is not desirable because different yeast produce different kinds of decomposition products. In order to get good vinegar it is essential to destroy all these naturally occurring yeasts and other micro organisms by pasteurization and then to inculcate the sterilized juices thus obtained with pure yeast. Pure wine is sold in the market in a compressed form. A starter is prepared from this by adding to the fruit and sugar solution to be fermented. Alcoholic fermentation occurs in two stages. The first is preliminary or the vigorous fermentation and the second is slow fermentation. During the first 3-6 days most of the sugar is converted into alcohol and carbonates. The second fermentation is much slower and usually takes 2-3 weeks. Under favorable condition, the fermentation complete in a period ranging from 72 to 96 hours, completely fermented juice usually exhibit a reading of about zero or less. When fermentation is complete, the yeast and the fruit pulp settle to form a compact mass at the bottom of the cask. The fermented liquid is separated from this sedimentation by siphoning.

Acetic-acid fermentation. Acetic acid fermentation is brought about by acetic acid bacteria (Acetobacter). Acetic acid fermentation should be carried in dark rooms fitted with orange and red glass pans. For acetic acid fermentation, the alcohol content of the fermented liquid is adjusted to 7-8% alcohol because acetic acid bacteria do not function properly at high strength.

Aging. When the vinegar has reached its maximum strength it must be aged so that it is at its best quality for table use. The aging is generally brought about in tanks or in barrels that are kept full and closed so that destruction of acid by oxidation of the vinegar bacteria will not occur. The aged vinegar should be blended as per the recipe by adding caramel, color, etc. and is filtered. It is then filled in glass bottles and sealed with pp caps. The sealed bottles are cooled, labeled and packed in cartons for marketing (Anonymous, 2010).

METHODOLOGY

Locale and Time of the Study

The research was conducted at Kayabang Multi Purpose Cooperative, Bayabas, Sablan, Benguet (see figure 3) and Julio and Julia's Food Products at Long-long, La Trinidad, Benguet (see figure 4) from the month of December to January.

Respondents of the Study

The respondents of the study are 2 managers or owners of fruit vinegar processing enterprises taken from Sablan, Benguet (Kayabang MPC) and 1 will be taken in La Trinidad, Benguet (Julio and Julia Food Products). Other respondents of the study are 5 fruit vinegar workers who are directly involved in vinegar processing. A total of 7 respondents taken randomly as respondents of the study.

Data Gathering Procedure

The data gathering was done through administering of questionnaires to the respondents and was followed by a personal interview to validate their written answers on the questionnaires. Problems encountered with regards to quality by the respondents were asked.

Data Gathered

The data collected are the profile of the respondents. Also, their knowledge and understanding about quality, quality management practices, and strategies of the following

parameters; location of business, fruit vinegar processing flow, facilities and equipments, process and capacity management were gathered.

Data Analysis

The data gathered was tabulated and analyzed using frequency and other appropriate statistical tools were used.

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

The study was conducted to assess the quality management practices in fruit vinegar processors in Sablan and La Trinidad from December 2012 to January 2013. The study have sought to determine the perception and understanding of fruit vinegar processors about quality, to identify the production practices from the procurement of inputs until the desired product has been produced, quality management practices employed by fruit vinegar producers and to determine the encountered problems with regards to processing and quality management.

One manager and five workers from Kayabang MPC and one manager of Julio and Julia's Food Products served as the respondents. The data gathered was done through survey questionnaire and personal interview with the respondents.

The study revealed that majority of the manager and workers/processors are female and belonged to 46-55 age bracket, most are high school graduate and married. The respondents are involved in processing fruit vinegar for almost four to five years. Some of them did not attend seminars and training but majority have done fruit vinegar making, food handling and labeling, and food processing including vinegar that was sponsored by different agencies for the reason that they wanted to improve the quality of their product and also with the management style. The other business operates as cooperative on is processing banana and pineapple vinegar and another one is sole proprietorship which in processing strawberry cider vinegar.

Their location (processing area) and lay-out is safe for the employees and customers, majority of the raw materials or main ingredients source for the fruit vinegar are being procured from other suppliers, and claim that they have standards in selecting and proportion of their raw materials. The variety of fruit that they were choosing was the sweet charlie for the strawberry cider vinegar, Saba for banana and any variety for pineapple. Both processors are practicing 18 stages in processing fruit vinegar, considers the DTI labeling requirement, and claim that they maintain the same design in their label. In terms of facilities and equipment, the fruit vinegar processors have their own room and building that is exclusively for processing.

The fruit vinegar processors applies quality control tools in their business such as check sheets and brainstorming in order for them to determine the problems and develop their weaknesses to become their strengths and be able to produce a better product quality for longer term engagement to the business. They also established product quality and do inspection before production, during and after processing or until the finished product are delivered to its designated places. Both of the processors are doing book keeping and strict monitoring or avoiding problems to arise as their quality product assurance, set some quality standards in producing their product but some of this is attained and some are not. Both business admits to been encountering problems and difficulties in material sourcing such as seasonality of fruits, processing technique like sediments (hazy color) ,and marketing competitiveness. While in the quality management practices, both of the managers claim that the problem they encountered is the absence of some instruments to test the product.

Conclusions

Based on the result of the study, the following conclusions were drawn:

1. Most of the respondents claim that quality has something to do with the perfection of the product and has focused more on the standard to meet the consumers the expectation and requirement.

2. The production practices of the fruit processors starts from harvesting or selection of fruits, cleaning until the finish or desired product is produced, packed and ready for market or to be delivered to the outlets such as to the barangay food terminal for KMPC and to OTOP for J and J's Food Products. The production practices of the processors are strictly monitored in all the production levels to make sure that there are no changes in the production standards set by the processors and also to ensure the production of good quality of fruit vinegar.

3. The quality management practices employed by the fruit vinegar processor include four quality categories. The first one is the quality control tool wherein J and J's Food Products uses check sheets and brainstorming for KMPC and the entire members gather together to share their ideas and find solutions to the problem. The second category is the establishing of product quality wherein KMPC see to it that quality varies depending on the process and on the raw materials that is being used. Julio and Julia's food products establish the quality of the product by maintaining consistency in taste, color, and acidity level. Both of the processors do inspection in all level of production to ensure quality product standards. Both also observer(KMPC and J and J's Food Products) the quality product assurance; a) record keeping, b) strict monitoring while processing to avoid

deviations on the processing, c) BFAD and DTI certified, c) safeness of product storage and transportation, and d) product is laboratory certified.

4. Fruit vinegar processors encountered problems in processing, which KMPC include the seasonality of fruits and high cost of pineapples. The problem encountered are the removal of stubborn dirt, the common residues and sediments are mixed with the vinegar, the cooperative lacks facilities and equipment, the high cost or price of the bottles and on the part of the marketing, is the level of competition because of the commercial vinegars. With regards to Julio and Julia's Food products the problems encountered in processing are the removals of dirt, sediments that are mixed with the strawberry cider vinegar, absence of filtering machine, lack of blue gin bottles, and absence of heat gun.

The problem encountered in quality management of the both plants is the absence of some equipments and materials which lead the processors not to be motivated to create and develop new ideas for the business.

Recommendations

1. The fruit vinegar processors together with the local officials can coordinate with accredited agencies like DTI and DOST to conduct more trainings and seminars on fruit vinegar on preparation and production.

2. The government agencies should set quality standards for fruit vinegar production and accompany it with trainings and seminars. Strict monitoring of DOH for the cleanliness of the raw materials should also be conducted by these agencies.

3. The two organizations should top up supports of government agencies for them to be able to acquire those equipments, and they should adopt bulk buying especially sugar from distributors to reduce cost of production. And because of seasonal production of

fruits, the processors should discover more fruits that can be processed to avoid shortage of fruit vinegar for the whole year.

4. The measuring equipments and materials that are available should be properly separated to wine production, marked and calibrated to have a uniform mixture in the entire fruit vinegar production operation. Cleanliness and sanitation of the production area and processing should be maintained to avoid contaminations. Innovation or redesign of labels should be done and add the information such as date of manufacturing, nutritional contents, contact number and barcode, batch number. Both (KMPC and J and J's Food Products) processors should continually improved the processing plant to cope up with the industry standards and invest in quality but cheaper in price of technology, facilities and equipments. The processors should avail of special municipal and provincial events such as trade fairs for marketing.

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