

EXPLORING FEASIBILITY AND PRODUCTION OF LONGAN FRUIT WINE AS A SMALL SCALE ENTERPRISE IN THAILAND

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ABSTRACT

Longan (*dimocarpus longan*) is a tropical fruit tree generally grown in the upper northern provinces of Thailand. The fruit's white edible flesh is juicy and sweet. Even though it is the leading fruit crop export of the country, there has been an oversupply problem of longan in the market resulting in a significant decline in price. A short harvesting season and its highly perishable nature create a large, concentrated produce flow to the market with oversupply at the front and significant waste at the end. This reduces farm prices and farmers' income. In order to provide a remedy to these problems, many strategies have been devised. Longan processing, e.g. dried and canned, is one solution. Another one that is quite promising is based on laboratory research indicating that fruit wine made from longan could be a good wine with commercial value. The purpose of this study was to evaluate the longan wines made from fresh and dried fruit for potential small scale industrial production.

Keywords: Longan, *Dimocarpus longan*, fruit wine, winemaking

INTRODUCTION

Longan (*Dimocarpus longan*) is a tropical fruit tree generally grown in the upper northern region of Thailand. The official harvesting season runs from June to August and it is the leading export fruit crop of the country. The flesh of the fruit is juicy and white, it is edible either fresh or dried, and it is sometimes canned with syrup. Longan plays an important role in developing sustainable production systems of Thailand. Thailand is the world's largest producer of longan, with earnings of US\$57-\$61 million per year during the 2005-2007 period (Evans and Nalampang 2008). Of the overall production area, 95% of the 98 thousand hectare are located in the north, and the crop yield was approximately 433 thousand tons of longan in 2008 (http://www.acfs.go.th/news_detail.php?ntype=09&id=3144). Important cultivars are Edo, Haeo, Biew Khiew and Srichomphu. Seventy percent of the total production was exported as fresh, dried and/or canned longan, while 30% was consumed domestically as fresh (Anupunt and Sukhvibul, 2005). Longan fruits contain a significant amount of polyphenols. The study of longan antioxidant activity found that 4-*o*-methylgallic acid had higher reducing power and 2,2- diphenyl-1-picrylhydrazyl-(DPPH), hydroxyl radical-, and superoxide radical-scavenging activities than (-)- epicatechin (Jian, et al., 2007). The study of longan extraction by 70 % methanol from peel, pulp, and seed revealed that the major components were identified as gallic acid, corilagin (an ellagitannin), and ellagic acid (Rangkadilok, 2005). The analyses showed that there was a large variation in the contents of gallic acid, corilagin, and ellagic acid in different plant tissues and from different cultivars. The seed contained the highest levels of the three phenolics, and pulp contained the lowest. Among commercial cultivars, Biewkiew and Edo contained the highest levels of gallic and ellagic acid while Srichompoo contained the highest content of corilagin. The author suggested that these three cultivars might be used in directed breeding and cultivation programs and to develop concentrated longan seed extracts to promote good health. Utilization of this by-product material will put to use of thousands of tons of waste longan seeds from the canned longan pulp production.

Longan and Agricultural Produces Lamphoon Cooperatives Ltd. (LAPLC) expressed an interest in developing longan wine as a commercial entity. The trial commercialization of longan wine as a small scale enterprise was undertaken between Lampang Agricultural Research and Training Center (LARTC) and LAPLC. In its first phase, it consisted of identification of the appropriate longan must preparation, fruit varieties, production season, and type of longan (fresh and dried fruits) to identify a consistent raw material for high quality longan wine production. Importantly, consumer acceptance of longan wine was also investigated.

MATERIALS AND METHODS

1. Laboratory study

The study of longan wine making process included the following 5 steps.

1.1 Selection of the preparation method for good raw material. There were 4 methods of longan must preparation: whole fruit (WL), flesh with peel (FP), flesh with seed (FS) and flesh only (FO).

1.2 Selection of the appropriate yeast strain for fermentation. Logan wine quality was compared for two yeast strains, *Saccharomyces cerevisiae* (HK4) and *Saccharomyces bayanus* (EC1118). The quality parameters were rate of fermentation, alcohol content, residual sugar, volatile acidity, acetaldehyde, and organoleptic quality.

1.3 Selection of the appropriate food additive addition during fermentation. Diammonium phosphate, pectinase enzyme, bentonite, potassium metabisulphite and sugar were added into longan must in order to adjust the appropriate longan must to get good longan wine quality consequently.

1.4 Selection of the best fruit variety and production season for wine making. Three longan varieties were studied, Edor, biewkiew, and Srichompoo. Both in-season (July-September) and off-season (March-May) fruits were used in the study.

1.5 The quality of wine made from fresh and dried fruit was compared. After selection the best winemaking process, longan wine made from fresh and dried fruit were compared.

2. Consumer study

Sampling 210 consumers in Chiangmai and Lampang determined the consumer acceptance of longan wine. Both fresh and dried fruit wine was used as the sample for this evaluation.

3. Small scale enterprise longan wine production.

A batch of 500 litre of longan wine fermented in a stainless steel tank was run at LARTC and LAPLC. This run gave the basis for determining the size of the capital needed for small-scale sustained production.

4. Technology Transfer

LARTC staff transferred the know-how gained from the study to entrepreneurs during 2 years in fruit wine workshops arranged by LARTC. A workshop on traditional fermented and distilled beverage industry in Thailand in co-operation with the Department of Biotechnology, Mahidol University, also served as a technology transfer vehicle. InWEnt-Capacity Building International, Germany subsidized and helped organize this workshop. During it the know-how from fermentation to product marketing were transferred.

RESULTS AND DISCUSSION

1. Laboratory study

Fermentation of longan must produces longan wine with a quality that is accepted as a white wine with the typical longan aroma. The most effective process studied was the use of 200 g/l sugar of WL must with EC1118 yeast strain including the adding of 200 ppm potassium metabisulphite (KMS)

and 120 ppm diammonium phosphate (DAP). Longan wine made from golden brown dried longan fruit performed as good as white wine (Figure 1 a).

2. Consumer study

Fifty percent of the consumer samples were male. The age of 49 % of them were between 20-35 years old .Most (48 %) of the sample had graduated with a bachelor degree. Most of them (35%) were government officials. Their income ranged between 5,000-10,000 Baht/month. Fifty three percent those sampled preferred wine made from dried fruit must more over fresh fruit must. The reason was that the straw color of dried longan wine was as same as white wine (figure 1b).

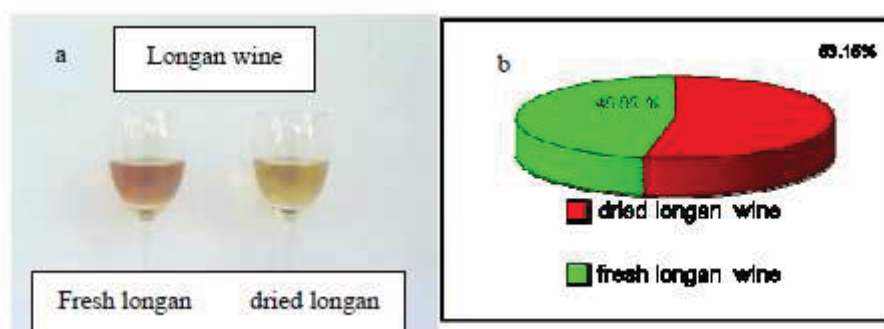


Figure 1: Longan wine (a) and consumer acceptance of longan wine (b)

3. Small scale enterprise longan wine production.

The process of both fresh and dried longan wine making were confirmed at LARTC and produced at LAPLC. It was found that the both wines had the same quality as those from laboratory study. The capital outlay for the investment of a production run of 80,000 bottles per year (750 ml per bottle) was about 5 million Baht. The cost was 55 Baht per bottle. The investment cost could have a rate of return of 2 -3 years depending on how the marketing is managed.

4. Technology Transfer

The 6 members of LAPLC were trained for longan wine making and longan wine sensory evaluation at LARTC. After training, LAPLC members produced their own wine, while RMUTL researchers monitored the processing. The members could successfully apply knowledge obtained from the training for longan wine making. However, further study on the market research would help the LAPLC to operate their business autonomously. Development of some instruments is also required in order to reduce the production cost. In addition, a study for longan wine demonstrating its health benefits would be interesting research having the potential of opening another consumer market.

The transfer of know-how to other entrepreneurs was done by a workshop highlighting the following.

1. Basic Knowledge about Fermented and Distilled Beverages
2. Satho and wine Process

3. Spirit Process
4. Quality Control of Fermented and Distilled Alcoholic Beverages
5. Satho and Distilled Spirit
6. The Application of Beer and Whisky Technology for Local Fermented and Distilled Alcoholic beverages
7. Management and Marketing of Satho and Spirit Business

There were 40 SMEs in attendance in the workshops. LARTC personnel trained entrepreneurs through consultation and site visits and helped them solve their problems. LARTC staff also consulted on Good Manufacturing Practice (GMP) in their wineries. RMUTL researchers learned problems occurred in those wineries during their visits. Some problems were discussed and solved in wineries with the researchers' advises, while some problems could be raised for research concept. Furthermore, RMUTL researchers gained more experience through this involvement and they can apply such experience for research work and fruit wine industry. The involvement of RMUTL and the community in this manner serves sufficiency economy.

At present some wineries produce longan wine and other fruit wines based on this research technology.

Depending on the quality of the fruit the price of longan wine is in the range of 150-350 Baht per bottle. Dried longan fruit as raw material can be used all year round for wine production. It can decrease the problem of surplus fresh longan in season.

CONCLUSION

Longan wine which was made from dried longan was accepted by most of consumers. Quality of the longan wine was as same as white wine especially the straw yellow color. Longan wine making based on RMUTL research was transferred to SMEs and they have used for their production. Winery members learned from LARTC workshop and LARTC researchers earned more experience through their collaboration. Both wineries members and LARTC researchers were beneficiaries.

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