Analysis and Research of Yellow Rice Wine Detection Teaching based on Virtual Simulation Technology

[1]Yu Mei, [2]Liming Xie and [3]Bin Zhou,
[1]Zhejiang Shuren University, China
[2,3]Zhejiang Environmental Monitoring Engineering Co.Ltd, China

Abstract: Yellow rice wine is not only a traditional Chinese wine, but also a treasure of China. It is rich in nutrition, is a set of enjoyment and health care in one brewing wine, can be used for cooking, both medicinal and other effects, in line with the trend of the development of world beverage wine, is listed as the key support and development of beverage wine by the state. The aging time of yellow rice wine is one of the main marks of its quality. It has become a common way for the yellow rice wine industry to express the quality of wine by its age. In this experiment, we developed a bionic electronic nose system. Combined with different pattern recognition methods, it was applied to the quality detection of rice wine.

Keywords: Virtual Reality, Interactive Mode, Rice Wine Detection, Cloud Platform, Identification Mechanism

I. INTRODUCTION

Since the 1990s, the national industrial policy has listed yellow rice wine as a "positive development" wine, and given preferential tax policies. Therefore, China's rice wine industry has recovered rapidly, the overall level has improved significantly, the economic indicators have risen step by step, and the brand building has greatly improved. After a period of hesitation from 1998 to 2002, the annual growth rate of China's rice wine production has been as high as 10% since 2002, and exceeded 3 million tons in 2011. China's rice wine industry has entered a fast lane of healthy development. In addition, in recent years, people have gradually respected the new drinking concept of health, nutrition, safety and palatability, which also brings hope and opportunities for rice wine enterprises to explore the market and revitalize the industry. Generally speaking, China's rice wine industry presents a thriving scene, I believe that the 21st century will be the century of rice wine.

High quality raw materials are the basic conditions for brewing high quality wine. Beer and wine brewing have attached great importance to the selection and research of brewing raw materials, and the correlation between raw material quality and wine quality has also been very comprehensive. However, there is no detailed study on the effect of rice on the quality of rice wine, only some simple empirical description. Brewing rice wine with glutinous rice is a valuable experience handed down from ancient China, but the components of rice are relatively complex. The endosperm structure, protein, amylopectin and other components of glutinous rice directly affect the quality of rice wine. At present, rice wine enterprises have begun to pay attention to the construction of glutinous rice raw material base, such as several large Shaoxing rice wine production enterprises have established bases in Anhui, Jiangsu, Hubei and other places. Due to the lack of research on the evaluation standard of the quality of glutinous rice for brewing and the breeding of glutinous rice varieties for brewing, the quality of glutinous rice is difficult to be guaranteed because of the water content, starch content and experience. At present, the varieties of glutinous rice in the base are in disorder. The glutinous rice quality problem causes the rice wine rancidity and quality decline every year, which brings huge losses to the rice wine enterprises.

For thousands of years, people used to use glutinous rice to make cakes, glutinous rice balls, cakes, porridge and other snacks. Compared with non glutinous rice, the consumption market of glutinous rice is very small, and the price fluctuates greatly with the market, so the planting area of glutinous rice is very small. In view of this, there is no unit specialized in glutinous rice breeding, glutinous rice varieties are only "by-products" in the process of rice breeding, and the type and number of varieties are very few. The fermentation process of rice wine is a double-sided fermentation process in which saccharification and fermentation are carried out at the same time. Rice is cooked and gelatinized, and then transformed into fermentable sugars through the role of enzymes in wheat koji. This process is called saccharification. Fermentable sugars are transformed into alcohol and carbon dioxide by yeast fermentation under anaerobic conditions. This process is called fermentation. Wheat koji is a kind of saccharifying agent for yellow rice wine production, which is produced by cultivating saccharifying bacteria on broken wheat grains. It provides various enzymes for yellow rice wine fermentation, mainly amylase and protease. These enzymes promote the hydrolysis of starch, protein and other substances in the raw materials, and at the same time, various metabolites formed in the koji making process produce color, aroma and taste, which endow the unique flavor of yellow rice wine. Yeast is an important starter, which can decompose carbohydrates to produce alcohol and carbon dioxide.

The mineral elements of rice wine include major elements and trace elements. The major elements are phosphorus, sulfur, magnesium, potassium, sodium and so on, while the minor elements are mainly iron, copper, zinc, manganese, aluminum and diamond. These elements mainly come from raw rice, brewing water, wine storage containers and fermentation process. The raw material of glutinous rice contains a considerable amount of mineral elements, which is one of the nutritional components of glutinous rice. These mineral elements were randomly transferred into the wine body during the fermentation of yellow rice wine.

II. THE PROPOSED METHODOLOGY

Virtual reality technology. Although traditional digital game creation has racked their brains to design many interesting interactive tools, they want to realize the interconnection between virtual space and real space of digital game. From the perspective of empiricism, there is no more immersive world than the real world that can be seen and touched. From the perspective of scientific and technological means at this stage, it is still a long way for human beings to create a highly simulated virtual world in the true sense. There is the concept of "the fourth wall" in the industry of drama and film and television.

The creators and actors in this field want to isolate the space of drama, film and television from the real space through the "fourth wall".

Interactivity is one of the important symbols of digital game works different from film and television works. In the era of science and technology changing life, the central link in the process of human appreciation of art works has changed from work centered to appreciation centered. Human beings have stepped into the electronic age and the Internet age. As a representative, the process of aesthetic appreciation has transformed into the creation of works by creators, the works becoming the information carrier, the transmission of information to the audience, the audience's aesthetic appreciation, feedback, modification, update, deletion and transmission of information in the works. This process of information transmission and change is the real main content of aesthetics.

"Explicit interaction" refers to the interaction of exchanging data through tangible props and visible media. The dominant way of interaction is abstract, which is refined and transformed from the mode of interaction between human and nature through logical thinking" The "dominant" interaction makes it possible for human beings to communicate with computers conveniently.

The two-way interaction mode of transmission and reception is not limited to the innovation of equipment. More importantly, it provides a generalized "two-way transmission and reception" interaction design thinking for digital games. Now in the scientific stage, the creation under this mode of thinking not only needs to consider the transmission and reception of a single electronic device system, but also needs to think about how to use the "hidden" interaction concept, through the application of all kinds of existing electronic devices, so that part of the human body organs can simultaneously play the function of receiving and transmitting information.

Detection of Nutritional Components in Rice Wine. Glutinous rice is more suitable for yellow rice wine brewing than japonica rice and indica rice. Compared with glutinous rice, the contents of protein, fat and amylose of Japonica rice, indica rice, corn and other brewing materials are higher. More protein, fat, ash and other metabolites will make the temperature rise and acid rise too fast in the saccharification and fermentation process of yellow rice wine, especially after invading miscellaneous bacteria. Wang Jianguo et al. Studied the influence of rice varieties and quality on the brewing of yellow rice wine, and considered that the rice for brewing yellow rice wine should be large in size, soft in quality, high in heart whiteness, high in starch content, high in amylopectin proportion, low in protein and fat content, and new rice should be used as far as possible. Therefore, the contents of starch, water and protein of different strains of glutinous rice were detected to prepare for the establishment of the correlation between the components of rice wine and the nutritional components of raw glutinous rice.

The amino acids in yellow rice wine mainly come from raw glutinous rice, followed by the introduction of water and yeast from wheat koji and brewing process. Part of the protein in the raw material is used by microbial fermentation, part of it is converted into aroma components, and the rest is left in the fermentation broth. The taste of yellow rice wine is rich, sour, sweet, bitter, spicy, astringent and fresh.
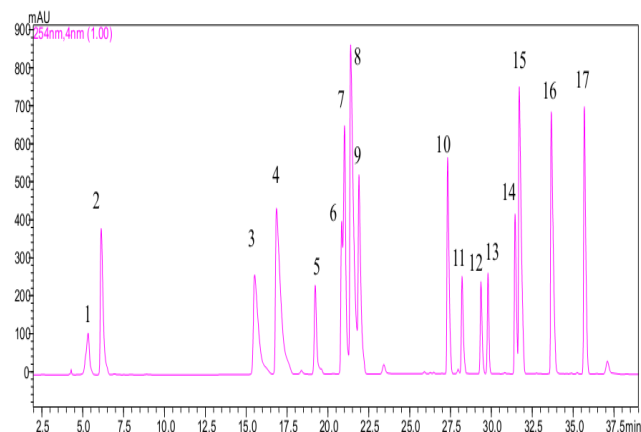

Figure 1. Standard mixed amino acid chromatogram

Organic acids are not only aroma, but also flavor substances in yellow rice wine. Together with other aroma and flavor substances, they constitute the unique taste and aroma of yellow rice wine. Organic acids can enhance the thickness of rice wine, reduce the sweetness, buffer and coordinate other flavor components. The yellow rice wine with less acid content has weak taste and uncoordinated body; If the acid content is too high, the sour taste will affect the overall flavor of the wine, and the proportion of various acids will also have a greater impact on the wine. The content of organic acids in rice wine was the highest in lactic acid and acetic acid. Lactic acid is relatively soft, which brings good flavor to yellow rice wine and enhances mellow feeling of yellow rice wine. The taste of acetic acid is often not very popular, mostly due to the introduction of too many mixed bacteria in the brewing process, the acetic acid content is too high, giving people a sense of rancidity. The convex change of lactic acid and acetic acid content is the beginning of rancidity of rice wine.

In recent years, researchers of yellow rice wine are committed to realizing the mechanization and modernization of yellow rice wine brewing, while constantly innovating the production process, and new yellow rice wine brewing technologies emerge in endlessly. Tao Shaomu and others developed a pilot scale high-temperature instant starch suitable for industrial production by referring to the new raw material treatment technology proposed by Japanese "baojiuzao" Co., Ltd α- A new type of yellow rice wine with unique flavor was obtained by applying the device to the raw material treatment of yellow rice wine. Sheng Fengyun et al. Crushed rice for wine making and liquefied it by adding amylase, systematically and deeply studied the control method of liquefaction degree, analyzed the synergy between wheat koji and enzyme, and laid a solid theoretical and scientific foundation for the development and application of the new process of producing yellow rice wine by liquefaction [7]. This research group combined extrusion technology with liquefying method, and creatively put forward a new technology of yellow rice wine brewing by adding enzyme extrusion liquefying method. Compared with the traditional method of producing rice wine, the fermentation cycle was significantly shortened, the fermentation efficiency was significantly improved, and the antioxidant capacity and amino acid content were significantly increased. The new process also has the advantages of energy saving and emission reduction, convenient for mechanized transportation and so on, which is conducive to the clean production of yellow rice wine. In addition, the new yellow rice wine brewed by this method is fresh and refreshing, soft and harmonious in taste, which has a good development prospect in the consumer market dominated by young and middle-aged people.

Discriminant Factor Analysis. At present, the detection of yellow rice wine with electronic tongue is mostly used in the qualitative classification of origin, wine age and authenticity. Although the classification of yellow rice wine by electronic tongue is more intuitive, it can not reflect the relationship and similarity between different yellow rice wine, so we need to combine electronic tongue, sensory evaluation and physical and chemical index detection to analyze its internal correlation. Xu Chunhua studied the technology of rapid quantitative detection of organic acids, reducing sugars and amino acids in taste flavor components of yellow rice wine by electronic tongue. It was found that the response value of electronic tongue had a nonlinear relationship with taste flavor components, and the established quantitative model was only effective for some indicators. Similar studies also showed that the response value of electronic tongue had a certain relationship with physical and chemical indexes and components of rice wine, but the establishment of relationship model was difficult. The application of electronic tongue in the quality detection of rice wine needs further improvement in order to reach the practical application level. In the follow-up study, the style and characteristics of yellow rice wine will be accurately and objectively evaluated by electronic tongue combined with electronic nose, gas chromatography-mass spectrometry, olfactory detector and other technologies.

There was a positive correlation between glutinous rice starch and liquor yield of rice wine. High glutinous rice starch was beneficial to improve liquor yield of rice wine. There was a negative correlation between amylose content of glutinous rice and yield of rice wine. High amylose content was not conducive to improving yield of rice wine. Glutinous rice fat, protein, mineral elements and moisture had no significant effect on the yield of rice wine. The total regression coefficient between the fat of glutinous rice and the free fatty acids in rice wine was 0.569. The fat content in glutinous rice was high, and the total free fat content in rice wine tended to increase. At the same time, the effect of glutinous rice fat on the specific fatty acid content of rice wine was not obvious. The effect of glutinous rice protein on amino acids of rice wine was very obvious. The overall correlation coefficient of glutinous rice protein and amino acids in rice wine was as high as 0.940, and the overall correlation coefficient of amino acids in winter yellow rice wine and glutinous rice protein was as high as 0.553, reaching a very significant level. The higher the total protein in glutinous rice, the higher the content of free amino acids in rice wine. The higher the total protein content of glutinous rice, the better the taste of rice wine.

At present, as far as the control of rice wine fermentation process is concerned, most small and medium-sized enterprises are still in the initial stage of relying on experience. Although some large enterprises have established the analysis room for sampling and analysis, this off-line physical and chemical analysis method needs a lot of organic reagents, which is time-consuming and labor-consuming, and can not obtain real-time information. The delay of obtaining fermentation information often leads to the fermentation process can not be adjusted in time, resulting in poor quality stability of rice wine between batches. Therefore, looking for a fast, timely and accurate detection technology to realize the real-time detection of large quantities of samples is of great significance to ensure the stability and continuity of rice wine production. At the same time, it is also of great significance to promote the rapid development of China's rice wine industry, realize the modernization and industrialization of rice wine industry, and revitalize the traditional brewing industry. In recent years, molecular vibration spectroscopy technology has been widely used in the field of fermentation food quality monitoring.

CONCLUSION

In this paper, the correlation between the nutritional components of glutinous rice and the composition of rice wine was studied, and the effect of the nutritional components of glutinous rice on the composition of rice wine was obtained theoretically. However, the sugar content of yellow rice wine is low and the taste is light, which can be improved in the future.

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