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Chinese localisation of wine aroma descriptors: an update of *Le Nez du Vin* terminology by survey, descriptive analysis and similarity test

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ABSTRACT

Aroma is an important criterion for describing and evaluating wine. The aroma descriptor system currently used in wine analysis is based on Western culture and is thus often inappropriate for use by other cultures to enhance their enjoyment of wine. The objective of the present study was to update this widely applied system to facilitate Chinese participation. The 54 wine aroma descriptors of the original *Le Nez du Vin* Master Kit were updated based on the results of a survey of 150 untrained Chinese wine consumers who identified the aromas unfamiliar to them. A descriptive sensory analysis was then performed by a panel of 22 untrained wine tasters to identify hypothesised equivalents of the remote lexicons. New aroma reference standards were proposed to verify the hypothesised equivalents between local and non-local terms based on the similarity test. Three unfamiliar descriptors were kept owing to their similarity to the revised attributes and no suitable substitutions were found for four aromas. In the new system, 13 terms are replaced by Chinese local aroma attributes. To the best of our knowledge, this study is the first to propose a Chinese-localised wine aroma wheel consisting of 7 categories, 16 sub-categories and 53 descriptors.

KEYWORDS: Wine, aroma descriptor, Chinese, aroma wheel

INTRODUCTION

The aroma is one of the most important organoleptic properties used to evaluate wine quality and style. The chemistry of wine aroma consists of diverse compounds (e.g., higher alcohols, terpenoids, esters, fatty acids and aldehydes) that are affected by various factors related to grape variety, terroir, wine fermentation procedures and the aging process (Peynaud and Blouin, 2013; Waterhouse *et al*., 2016). Wine aroma descriptors are widely used to describe the complexity and diversification of wines in wine tasting note and scientific studies. Descriptive sensory analysis, a method for discrimination and qualitative measurement, is used extensively for the sensory evaluation of food and beverage products, such as chocolate, potatoes, wine, rum and beer (De Pelsmaeker *et al*., 2019; Parker, 2017; Sharma *et al*., 2020). The descriptive analysis method is used to identify the unique qualitative aspects of wine, such as aroma, appearance, flavour, texture, aftertaste and sound upon consumption (Murray *et al*., 2001).

Aroma description is a challenge for the wine industry, because the terms used to describe a particular wine can vary among consumers. Thus, standardised terms, definitions and references for a product can result in more effective comprehension and discussion of the differences between products within a particular category (Lawless and Civille, 2013). A significant amount of effort has therefore been devoted to standardising such terms, which has facilitated communication between oenologists, sommeliers and wine consumers. In 1981, Jean Lenoir developed a library of aromas for use in wine taster training in olfactory perception and aroma description. Known as *Le Nez du Vin* Master Kit, this aroma set contained 54 concentrated flavour essences which fall into six categories, namely fruity, floral, vegetal, spicy, animal and bakery (J. Lenoir, 1981). This set of wine aroma kits has been very popular in Chinese wine education until now. In 1984, the Sensory Evaluation Subcommittee of the Technical Projects Committee of the American Society for Enology and Viticulture (ASEV) developed a list of standardised wine terminology (Noble *et al*., 1984). Shortly thereafter, the list was updated and a new evaluation tool known as the wine aroma wheel was developed on the basis of reference compositions. In this system, the 54 aromas included in the original master kit were categorised as 12 first tiers, 20 second tiers and 94 third tiers (Noble *et al*., 1987).

Although wine aroma descriptors have been extensively developed, the standard description system in current use still reflects Western culture. Some researchers have suggested that the regional differences in language may differ in terms of food description (Andani *et al*., 2001; Corsi *et al*., 2017; Tu *et al*., 2010). However, many Chinese consumers face challenges when evaluating wine aromas using the present lexicons owing to their lack of familiarity with some Western flowers, fruits, spices and herbs. Such consumers are thus unable to relate a standard reference aroma to a particular product, resulting in impatience and frustration during the wine evaluation process. Therefore, wine aroma descriptors need to be adapted to the local environment and language, and they should be applicable to all consumers. The present study, which focuses on Chinese wine consumers, introduces an updated wine aroma wheel that uses localised terms to enable their use of a standard system. In particular, the original 54 descriptors and references of *Le Nez du Vin* were updated on the basis of a survey conducted to identify the unfamiliar aroma lexicons. Based on the results, candidates for substitution terms were collected and wine aroma lexicon references were established. Finally, the new system was evaluated by comparing the results of tests that used the unfamiliar wine aroma terms and references with the results of tests with the new lexicon. This study represents a first trial for establishing a Chinese-localised wine aroma glossary, which will improve the communication of wine aroma characteristics within the Chinese wine tasting-community, comprising oenologists, sommeliers and consumers. Moreover, it is hoped that the results will increase the enthusiasm of Chinese consumers by enhancing their understanding and appreciation of wine.

MATERIALS AND METHODS

1. Experiment 1: Questionnaire to identify non-local terminology

For the survey, 150 untrained native Chinese participants comprising 57 males and 93 females between the ages of 18 and 30 years old were recruited. All participants were unfamiliar with wine nuances and none had experienced foreign travel. In the questionnaire, the participants were asked to select one or more unfamiliar wine aroma descriptors from the 54 original terms in *Le Nez du Vin* (Lenoir, 2006), which contained: fruity aromas (lemon, grapefruit, orange, pineapple, banana, lychee, melon, muscat, apple, pear, quince, strawberry, raspberry, red currant, black currant, blueberry, blackberry, cherry, apricot, peach, almond, prune and walnut), floral aromas (hawthorn, acacia, linden, honey, rose and violet), vegetal aromas (green pepper, mushroom, truffle, yeast, cedar, pine, licorice, black currant bud, cut hay and thyme), spicy aromas (vanilla, cinnamon, clove, pepper and saffron), animal aromas (leather, musk and butter) and bakery aromas (toasted bread, toasted almonds, toasted hazelnut, caramel, coffee, dark chocolate and smoked).

2. Experiment 2: Collection of Chinese-equivalent terms and references

Twenty-two panelists from the Food & Wine School of Ningxia University were recruited for this project. Each panelist had over 10 h of training in general descriptive analysis and more than 200 h of wine tasting experience. Using *Le Nez du Vin* wine aroma kit as a reference (Lenoir, 2006), the tasting panel of 11 males and 11 females was asked to identify 20 standards with unfamiliar aromas (based on the survey results of Experiment 1). All of the participants were native Chinese from the Ningxia (8), Hunan (4), Hebei (4), Henan (3), Jiangsu (2) and

Gansu (1) regions of China.The panelists were asked to smell the aromas deemed unfamiliar, and each was asked to record as many hypothesised Chinese-equivalent aroma descriptors as possible based on the smells they encounter in daily life. Single or multiple substitutions of a descriptor were accepted. If no suitable aroma was identified to replace the target term, "None" was specified in the questionnaire. Expressions with the same or similar meanings and redundant terms were eliminated by five well-trained panelists. Only terms that were unambiguous, non-redundant and non-hedonic were included in a list of preliminary descriptive terms (n = 42) (Larssen *et al.*, 2018). Based on the results of the hypothesised equivalent terms, the newly selected aroma reference standards were obtained from supermarkets, online markets, pharmacies and florist shops (Table S1).

3. Experiment 3: Verification of hypothesised equivalents between local and non-local terms

A substitution test based on a similarity test (Bi, 2005) was carried out on the 22 panelists mentioned in Section 2. The 20 aromas originally identified as unrecognisable in Experiment 1 and the proposed local references in Experiment 2 were used to verify the hypothesised equivalents. The reference standards were stored in opaque containers covered by aluminum foil (Figure S1). The panelists were required to smell each of the 20 unrecognisable aromas in the *Le Nez du Vin* kits and the hypothesised equivalent references. Afterwards, they rated the similarity of the local reference with the targeted kits on a five-point scale ranging from not similar (= 1) to very similar (= 5). A value of zero was attributed to the terms that did not need to be replaced. Finally, the proportion of the frequency count, with similarity values of more than zero, and the average similarity value were analysed.

4. Statistical analysis of data

The choice of items on the restricted list of substitution terms in Experiment 1 was based on how frequently the terms were chosen as unfamiliar lexicons (> 30 %), to target the most remote terminologies. In Experiment 3, attributes with frequency counts of less than 70 % or similarity values of less than 1.5 were eliminated. If the difference in similarity value between the highest value and the candidate value was greater than 0.75, the candidate with the lower value was removed. The remaining hypothesised equivalent terms replaced the target unfamiliar terms. The results of the survey and the similarity test were analysed using Microsoft Excel 2010. The word cloud was visualised using R version 3.6.3.

RESULTS

1. Experiment 1: Questionnaire to identify non-local terminology

The untrained Chinese wine consumers were unfamiliar with many of the aroma lexicons in *Le Nez du Vin* Master Kit (Figure 1). As a result, 20 terms with the lowest familiarity were screened out. These were: black currant bud with an unfamiliar frequency of 134, quince with 130, linden with 124, thyme with 99, saffron with 96, raspberry with 93, black currant with 89, cedar with 87, red currant with 86, hawthorn with 84, musk with 79, clove with 76, grape with 75, blueberry with 74, truffle with 73, toasted hazelnut with 70, violet with 63, cut hay with 59, blackberry with 58 and grapefruit with 45. Each of these terms appeared more than 44 times in the questionnaire results, accounting for at least 30 % of the total survey responses. The most unfamiliar lexicons were black currant bud and quince, with frequency counts of 89.3 % and 86.67 % respectively. The aroma attribute "black currant bud" was usually used without reference, even in France; hence, it was not surprising to find that it was the most unfamiliar wine aroma descriptor. Furthermore, most of the unfamiliar terms were from fruity, floral and vegetal categories. From the spicy, animal and bakery categories, saffron, clove, toasted hazelnut and musk were unfamiliar to the participants, at frequency counts of 64.00 %, 50.67 %, 46.67 % and 52.67 % respectively.

2. Experiment 2: Collection of Chinese-equivalent terms and references

The substitution terms were collected in Experiment 2 after the first aroma test was performed. Single or multiple substitution lexicons of a term were acceptable. The frequencies of all local aroma candidates were analysed using word cloud diagrams (Figure 2). No substitution aromas were identified for black currant bud, clove, violet or saffron, as indicated by the "None" responses by most of the panelists (n > 5) and no substitution lexicon could achieve an agreement (n > 3), implying that the panelists have not encountered these aromas in their daily lives. Blueberry, cedar and toasted hazelnut were not changed because most of the frequency substitution terms (n > 5) were similar to the original lexicons. For the 13 remaining descriptors (quince, linden, thyme, raspberry, black currant, red currant, hawthorn, musk, muscat, truffle, cut hay, blackberry and grapefruit), the proposed substitution reference standards were prepared for the second aroma test.

Aroma reference standards were created on the basis of the substitute aroma terms collected. Some of the proposed terms referred to a category of aromas (e.g., mushroom, Chinese herbal medicine, pepper and perfume) rather than that of a particular thing, substance or type, etc. These aromas were subdivided into more easily-recognisable aromas; for example, different types of mushrooms (*Pleurotus ostreatus*, *Agrocybe aegerita*, *Flammulina velutipes* and *Lentinus edodes* (Berk.) sing.) were obtained from a Chinese market, and diverse types of pepper common in Chinese daily life were also obtained (black pepper, white pepper and Sichuan pepper). Chinese herbal medicines were subdivided into *Agastache rugosa* (Fisch. et Mey.) *O. Ktze., Dalbergia odorifera* T. Chen, *Radix Dolomiaeae* and *Cyperus rotundus* L. Because an excessive number of perfume types was included, the term "perfume" was removed. Hence, the following aroma candidate substitutes for the 13 original descriptors were selected: for **quince**: green apple, lychee, strawberry, peach and apple-pear; for **linden**: lilac, lavender and *Sophora japonica* Linn.; for **thyme**: white pepper,

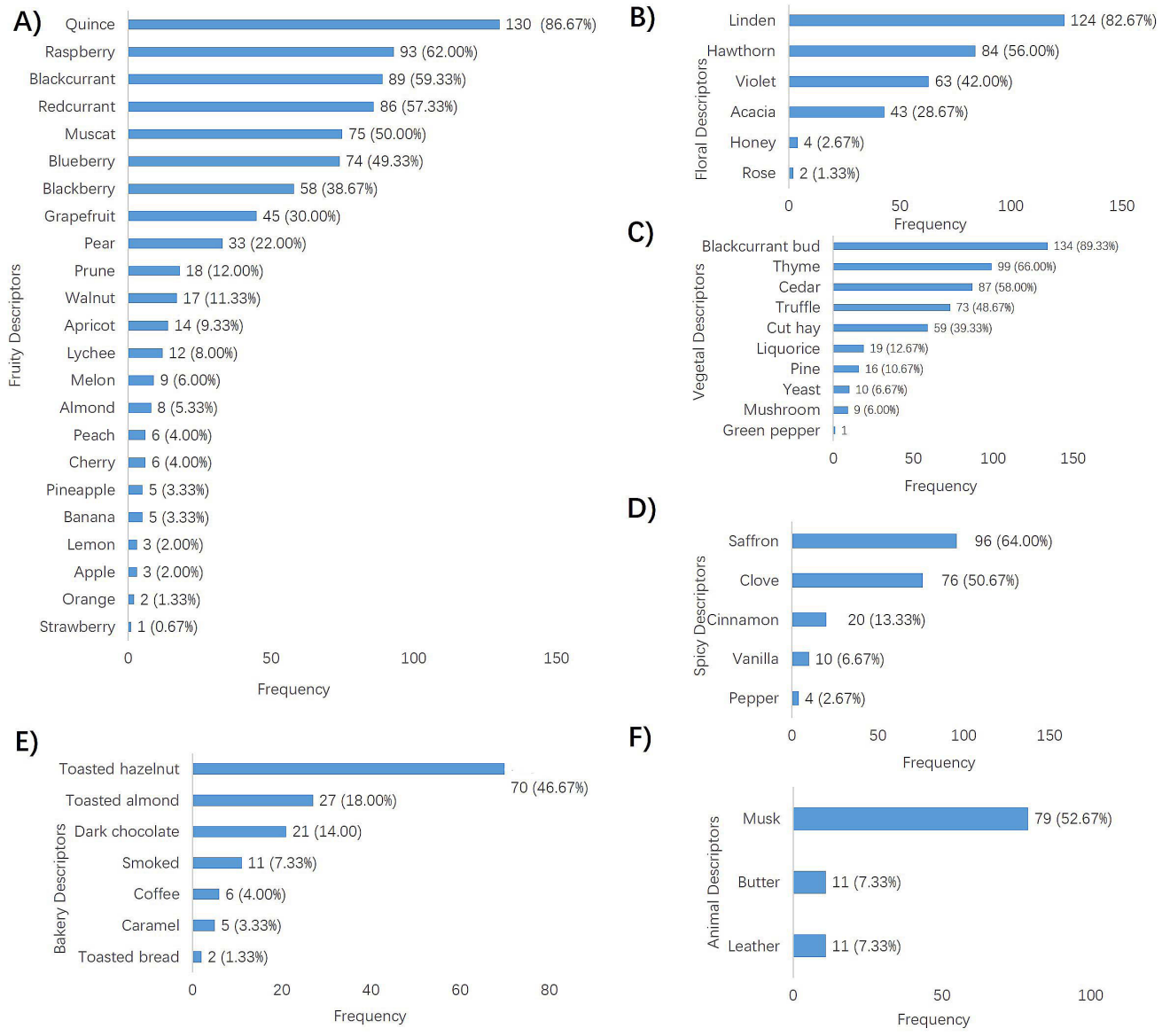


FIGURE 1. Unfamiliar frequency of aroma attributes included in the survey. The values in brackets represent the frequency counts.

black pepper, Sichuan pepper, fengyoujing and safflower oil; for **raspberry**: blueberry; for **hawthorn**: dry almond and toasted almond; for **black currant**: Chuanbei loquat paste, cough syrup and hawthorn cake; for **red currant**: Chuanbei loquat paste, cough syrup and kiwi; for **musk**: cat fur, dog hair, dog feces and cat feces; for **muscat**: washing powder and papaya; for **truffle**: *P. ostreatus*, *A. aegerita*, *F. velutipes* and *L. edodes* (Berk.) sing.; for **cut hay**: *A. rugosa* (Fisch. et Mey.) O. Ktze., *D. odorifera* T. Chen, *R. Dolomiaeae*, and *C. rotundus* L.; for **blackberry**: lily and rose; and for **grapefruit**: orange, lemon and pomelo. Table 1 provides photographs of these 42 substitute aroma candidates, which are listed in English and in Pinyin Chinese.

3. Experiment 3: Verification of hypothesised local equivalents of non-local terms

The 13 targeted *Le Nez du Vin* aromas are presented in Table 2 along with their substitution aroma references. To verify that correct replacements were selected, the similarity between the targeted attributes and the substitution candidates was evaluated by applying the similarity test based on both the frequency count and the average similarity value. As shown in the table, the frequency counts of safflower oil, fengyoujing, toasted almond, *L. edodes* (Berk.) sing. and rose were under 70 %; thus they were eliminated first. The similarity values for cat feces, dog fur, dog feces and

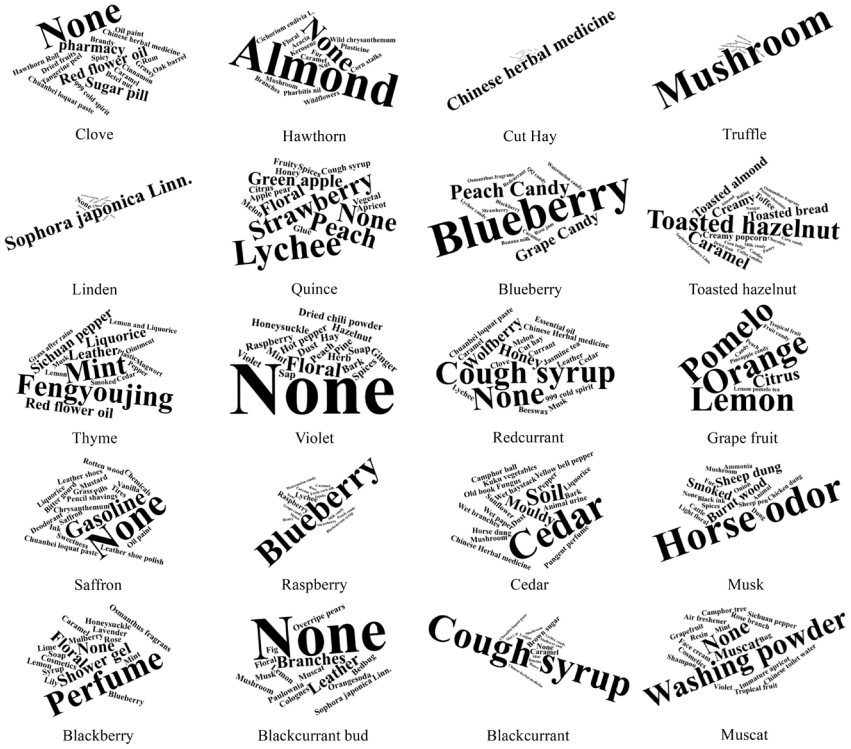


FIGURE 2. Word cloud of substituted candidates.

F. velutipes were under 1.5 and therefore also removed from the substitution list.

Specifically, among the alternatives to the quince flavour, the aroma of green apple was cited the most often, with a similarity value of 2.45. The values for the similarity of lychee, strawberry, peach and apple pear to quince were 1.95, 1.91, 1.91, and 1.86 respectively. Linden was replaced by lilac, lavender and *S. japonica* Linn., with similarity values of 2.05, 1.73 and 1.64 respectively. To replace thyme, black pepper, white pepper and Sichuan pepper all had 100 % frequency counts and high average similarity values of ≥ 2.5. Because the term "pepper" was included in the original list of aroma descriptors and more than 97 % of Chinese consumers easily identified this aroma in the first survey experiment, thyme was replaced by pepper. Raspberry was recognised by seven panelists as blueberry in Experiment 2. In the verification, both blueberry powder and blueberry jam had high frequency counts of > 80% and an average similarity value of 2.5. Therefore, raspberry was replaced by blueberry. Hawthorn is a flower variety that is not well known by Chinese consumers. A high average similarity value of 3.2 was observed with almond, which negated the need for additional substitution candidates. Black currant was replaced by Chuanbei loquat paste, cough syrup and hawthorn cake, with average similarity values of 2.36, 2.16 and 1.68 respectively. Both Chuanbei loquat paste and cough syrup are popular ingredients in Chinese patent medicine, and the sweet yet acidic flavour of hawthorn is popular in Chinese snacks. The flavours of Chuanbei loquat paste and cough syrup are similar to the aroma of red currant. Kiwi was eliminated owing to its large difference in similarity value (0.81). Cat fur was the only replacement candidate for musk. Both washing powder and papaya replaced muscat aroma. Although truffle was a remote term for Chinese consumers, its aroma is strongly similar to that of Chinese common mushroom such as *P. ostreatus* and *A. aegerita*. Because the similarity value difference between *P. ostreatus* and *A. aegerita* was 0.95, and thus greater than 0.75, *P. ostreatus* was the only replacement aroma term for truffle. All four types of Chinese medicine collected, including *A. rugosa* (Fisch. et Mey.) O. Ktze., *D. odorifera* T. Chen, *R. Dolomiaeae* and *C. rotundus* L. have aromas similar to that of cut hay. Lily was the only substituted aroma for blackberry. Orange, lemon and pomelo, with similarity values of 3.23, 3.14 and 2.66 respectively, replaced grapefruit.

In the end, 18 descriptors were removed from the original aroma wheel (Figure 3A). An updated aroma wheel was then developed that consisted of seven primary tier terms, 16 second-tier terms and 53 third-tier terms (Figure 3B). The 53 Chinese-localised aroma descriptors, divided into seven categories, were as follows: **fruity aromas**: lemon, pomelo, orange, pineapple, banana, lychee, melon, papaya, apple, pear, green apple, apple pear, strawberry, blueberry, cherry, apricot, peach, almond, prune and walnut; **floral aromas**: *S. japonica* Linn., lilac, lavender, honey, rose and lily; **vegetal aromas**: green pepper, mushroom, *P. ostreatus*, yeast, cedar, pine, licorice, *A. rugosa* (Fisch. et Mey.) O. Ktze., *D. odorifera* T. Chen, *R. Dolomiaeae*, *C. rotundus* L., cough syrup and Chuanbei loquat paste; **spicy aromas**: vanilla, cinnamon and pepper; **animal aromas**: leather, cat fur and butter; **bakery aromas**: toasted bread, toasted almond, toasted hazelnut, caramel, coffee,

TABLE 1. Information of local Chinese aroma descriptors.

Table 1 (part 1/3)

Le Nez Du Vin	Substitution	Pynin	Picture
Quince	Green apple	*píng guǒ*	
	Lychee	*lì zhī*	
	Strawberry	*cǎo méi*	
	Peach	*shuǐ mì táo*	
	Apple pear	*píng guǒ lí*	
Linden	Lavender	*Xūn yī cǎo*	
	Sophora japonica Linn.	*Huái huā*	
	Lilac	*Dīng xiāng*	
Thyme	White pepper	*bái hú jiāo*	
	Black pepper	*hēi hú jiāo*	
	Sichuan pepper	*huā jiāo fěn*	
	Fengyoujing	*fēng yóu jīng*	
	Safflower oil	*hóng huā yóu*	
Raspberry	Blueberry	*lán méi*	

Table 1 (part 2/3)

Le Nez Du Vin	Substitution	Pynin	Picture
Hawthorn	Almond (Dried fruit)	*xìng rén*	
	Toasted almond	*kǎo xìng rén*	
Black currant	Cough syrup	*jí zhī táng jiāng*	
	Chuanbei loquat paste	*chuān bèi pí pá gāo*	
	Hawthorn cake	*shān zhā gāo*	
Red currant	Kiwi	*mí hóu táo*	
	Cough syrup	*jí zhī táng jiāng*	
	Chuanbei loquat paste	*chuān bèi pí pá gāo*	
Musk	Cat fur	*māo máo*	
	Cat feces	*māo fèn biàn*	
	Dog feces	*gǒu fèn biàn*	
	Dog fur	*gǒu máo*	
Muscat	Washing powder	*xǐ yī fěn*	
	Papaya	*mù guā*	

Table 1 (part 3/3)

Le Nez Du Vin	Substitution	Pynin	Picture
Truffle	*Pleurotus ostreatus*	*píng gū*	
	Agrocybe aegerita	*chá shù gū*	
	F. velutipes	*jīn zhēn gū*	
	Lentinus edodes (Berk.) sing	*xiāng gū*	
	Agastache rugosa (Fisch. et Mey.) O. Ktze.	*huò xiāng*	
Cut hay	Dalbergia odorifera T. Chen	*jiàng xiāng*	
	Radix Dolomiaeae	*mù xiāng*	
	Cyperus rotundus L.	*xiāng fù*	
Blackberry	Lily	*bǎi hé*	
	Rose	*méi guī*	
Grapefruit	Lemon	*níng méng*	
	Orange	*chéng zǐ*	
	Pomelo	*yòu zǐ*	

TABLE 2. Similarity values of substituted aroma candidates.

Targeted non-local terminology	Hypothesised equivalent terminology	Frequency count (%)	Average similarity value	Equivalent Verified
Quince	Green apple	86.4	2.45	Y
	Lychee	86.4	1.95	Y
	Strawberry	81.8	1.91	Y
	Peach	77.3	1.91	Y
	Apple pear	81.8	1.86	Y
Linden	Lilac	81.1	2.05	Y
	Lavender	86.4	1.73	Y
	Sophora japonica Linn.	81.8	1.64	Y
Thyme	Black Pepper	100	3.70	Y
	White Pepper	100	3.20	Y
	Sichuan Pepper	100	2.50	Y
	Safflower oil	70	1.50	N
	Fengyoujing	70	1.40	N
Raspberry	Blueberry (Blueberry powder)	81.8	2.50	Y
	Blueberry (Blueberry jam)	91.9	2.50	Y
Hawthorn	Almond (Dried fruit)	90.5	3.20	Y
	Toasted almond	66.1	1.40	N
Black currant	Chuanbei loquat paste	95.5	2.36	Y
	Cough syrup	86.4	2.16	Y
	Hawthorn cake	77.3	1.68	Y
Redcurrant	Chuanbei loquat paste	86.4	2.45	Y
	Cough syrup	81.8	2.18	Y
	Kiwi	77.3	1.64	N
Musk	Cat fur	77.3	1.59	Y
	Cat feces	77.3	1.50	N
	Dog fur	77.3	1.41	N
	Dog feces	72.7	1.23	N
Muscat	Washing powder	86.5	2.05	Y
	Papaya	86.4	1.82	Y
Truffle	*Pleurotus ostreatus*	90.9	2.68	Y
	Agrocybe aegerita	90.9	1.73	N
	F. velutipes	72.7	1.41	N
	Lentinus edodes (Berk.) sing	59.1	1.32	N
Cut hay	*Agastache rugosa (Fisch. et Mey.) O. Ktze.*	86.4	2.32	Y
	Dalbergia odorifera T. Chen	90.9	2.14	Y
	Radix Dolomiaeae	95.5	1.95	Y
	Cyperus rotundus L.	86.4	1.64	Y
Blackberry	Lily	90.9	2.50	Y
	Rose	63.6	1.50	N
Grapefruit	Orange	100	3.23	Y
	Lemon	100	3.14	Y
	Pomelo	97.8	2.66	Y

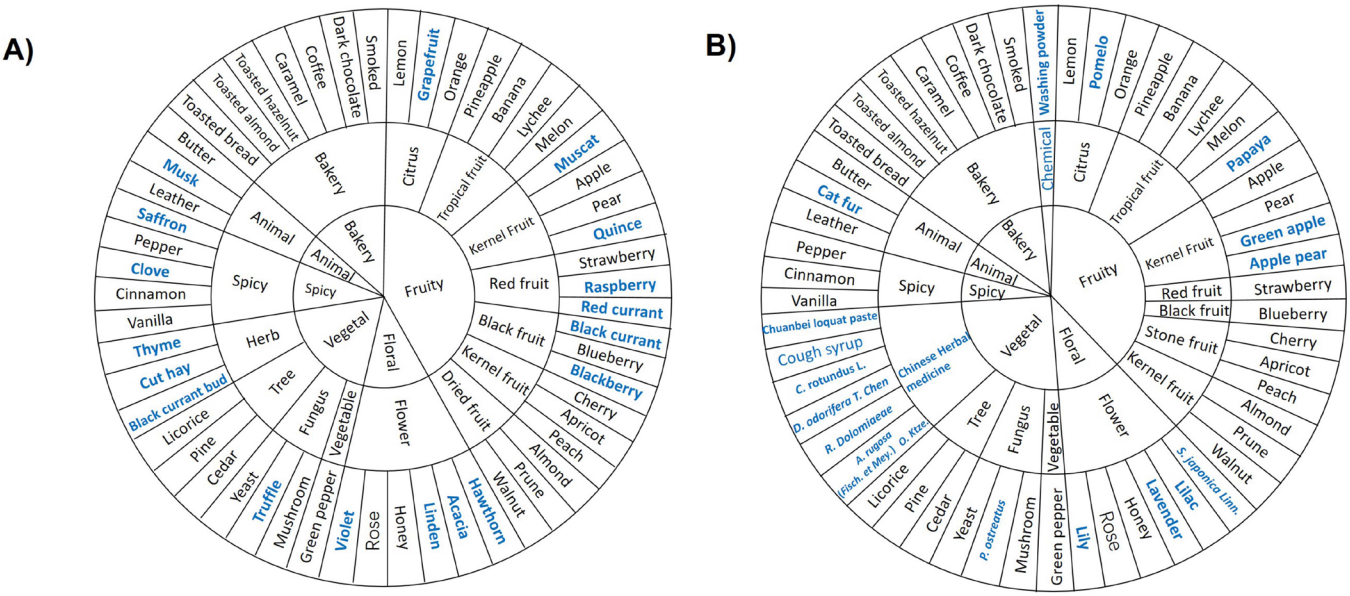


FIGURE 3. (A) Original wine aroma wheel based on *Le Nez du Vin*;(B) updated Chinese-localised wine aroma wheel.

dark chocolate and smoked; and **chemical aroma**: washing powder.

DISCUSSION

This study is the first to attempt to adapt traditional wine aroma descriptors to Chinese culture. Three main results were obtained. First, 20 wine aroma descriptors included in *Le Nez du Vin* were found to be unfamiliar to Chinese participants, resulting in a frequency count of at least 30 %. This finding is consistent with the results in the literature (Lockshin *et al*., 2017). The current system for wine aroma description is not appropriate for use in China because of the large discrepancy between familiar aromas in Chinese and Western cultures. This can be attributed to differences in natural environments (associated with fruity, floral and vegetal aromas), living habits (associated with vegetal and animal aromas) and cuisine (associated with spicy and bakery aromas). Second, as a result of the aroma test based on the *Le Nez du Vin* kit, 42 hypothesised local equivalent terms to replace the 20 targeted lexicons were collected and used as reference standards. In previous research (Corsi *et al*., 2017) derived 37 hypothesised equivalent pairs from an earlier study (Cho Lee, 2011) based on wine tasting experiences rather than experimental data. Because China covers a large geographical area, nuances exist in the different living environments and cultures of the diverse regions. The aforementioned earlier study (Cho Lee, 2011) is based mainly on Hong Kong and the entire Asian continent and does not focus on mainland China. Third, the present study is the first to develop a localised Chinese wine aroma wheel containing 53 aroma attributes grouped into seven categories, which is applicable to the diverse styles, ages and origins of wines. Thirty-six of these terms were derived from the original *Le Nez du Vin* aroma attributes that were considered to be acceptable to the Chinese participants of the study, and thirteen equivalent terms were replaced with thirty-one local lexicons. Unfortunately, four of the original descriptors, namely, black currant bud, clove, violet and saffron, could not be replaced owing to their high unfamiliarity values. It can be speculated that these aromas are composed of various chemical compounds unique to Western culture, which created challenges when finding substitutions familiar to the Chinese participants. However, regrouping aroma compounds during wine tasting by Chinese consumers can be used and could lead to the identification of additional local equivalent descriptors.

It should be noted that this study had several limitations. First, the aromas perceived by the participants varied depending on age differences, region of residence or living environment. Therefore, a more detailed classification of survey participants is needed; for example, older females might be more familiar with kitchen spices and Chinese medicines than younger participants; consumers from different regions of China described wine aromas based on their local fruits and floral lexicons. Second, because this study used the aromas of *Le Nez du Vin* as reference standards rather than those of actual materials, the smell of aroma kits made by flavour essence may have been unstable and have degraded quickly. Third, the present study did not validate the localised wine aroma terminologies in wines; because wine aroma characteristics can vary depending on grape variety, wine style, age and region of origin, the wine samples should be carefully prepared.

In summary, the results of this investigation showed that 20 wine aroma descriptors used in the currently system were unfamiliar to Chinese consumers with a frequency count greater than 30 %. A Chinese-localised wine aroma wheel consisting of 53 revised terms was therefore created.

Of the original terms, three were retained, including blueberry, cedar and toasted hazelnut, and thirteen were replaced by one or more equivalent local descriptors. Specifically, quince was replaced by green apple, lychee, strawberry, peach and apple pear; linden was substituted by lilac, lavender and *S. japonica* Linn.; thyme was replaced by pepper and fengyoujing; raspberry was replaced by blueberry; hawthorn was replaced by almond; black currant was replaced by Chuanbei loquat paste, cough syrup and hawthorn cake; red currant was replaced by Chuanbei loquat paste and cough syrup; musk was replaced by cat fur; muscat was replaced by washing powder and papaya; truffle was replaced by *P. ostreatus*; cut hay was replaced by *A. rugosa* (Fisch. et Mey.) O. Ktze., *D. odorifera* T. Chen, *R. Dolomiaeae* and *C. rotundus* L.; blackberry was replaced by lily; and grapefruit was replaced by orange, lemon and pomelo. No suitable local descriptors were found to replace the remaining four original attributes, namely black currant bud, clove, violet and saffron. This study revealed the existing aroma descriptors that confuse Chinese people during wine training. The proposed substitutions could facilitate communication between oenologists and consumers from different language backgrounds. Furthermore, the results of this investigation could allow Chinese people to describe wine aroma according to their own aroma recognition environment.

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