



Creating Sim Flower Scent (*Rhodomyrtus tomentosa*) for Product Sim Fruit from Natural Materials in Vietnam

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Authors' contributions

This work was carried out in collaboration between both authors. Author LHH designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author LMXT managed the analyses of the study and managed the literature searches. Both authors read and approved the final manuscript.

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ABSTRACT

Aim and Objectives: The purpose of this study is to reproduce the scent of Sim (*Rhodomyrtus tomentosa*) flower from natural substances present in Vietnam to replace the scent extracted from Sim flower.

Materials and Methods: All the materials for making the Sim flower fragrance and products from Sim fruit are natural sources in Vietnam.

Fragrance assessment by olfactory, the aroma is diluted 20 times with an odorless diethyl phthalate (DEP) solvent, followed by a special scent paper and the smell of the nose to assess the scent. The fragrance of Sim flower was tested on Sim syrup product 0.2%, Sim jam 0.5%, Sim wine 0.3% by weight.

Results: After the experiment, we have selected fragrance FW.1, FW.2 for Sim wine, FS.1 and FS.2 for Sim syrup, FJ.1 and FJ.2 for Sim jam.

The main aroma of Sim flower is made up of Aldehyde anisic, Cinnamaldehyde, Cinnamon bark

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oil, Linalool, Linalyl acetate, Linalyl cinnamate, Linalyl formate, Linalyl butyrate. Aldehyde anisic and Linalool are the main constituents that determine the aroma of Sim flower.

Conclusions: We have created the scent of Sim flower from natural materials in Vietnam for Sim wine FW.1, FW.2, for Sim syrup FS.1, FS.2, and Sim jam FJ.1, FJ.2. Sim flower FW.1, FW.2, FS.1, FS.2, FJ.1, and FJ.2 are added to Sim wine, Sim syrup, Sim jam to increase the value and appeal of the products made from Vietnam Sim fruit.

Keywords: Food; product; jam; syrup; wine.

1. INTRODUCTION

The scientific name of the Sim plant is *Rhodomyrtus tomentosa* (Aiton) Hassk., locally known as “Hồng Sim, Đào kim nương”, flowering plant belonging to the family Myrtaceae. The plant grows into bushes, of about 0,8 – 1,2m tall and mainly distributed in South-East Asian countries, especially Southern parts of Vietnam, Thailand, China Philippines, Malaysia and Japan. Sim plants are used in medicine for the treatment of diarrhea, dysentery, synaptopathy, stomachache, and wound healing. Fruits of Sim are used to make various health-beneficial products such as wine, syrup, jam.

There have been many studies on roots [1], leaves [2,3,4], fruit of *Rhodomyrtus tomentosa* (Ait.) Hassk [5,6,7]. Studies show that substances contained in *Rhodomyrtus tomentosa* have antioxidant and antibacterial properties [8,9], which should be used in medicine for healing [10,11], in skin-lightening agents, antiaging agents, inhibitors, and cosmetics [12].

In Vietnam, there are many studies on Nutritional composition [13,14], chemical composition [15,16,17], antioxidant activity [18,19], potent bioactive [20,21] from *Rhodomyrtus tomentosa*.

Sim fruit is used popularly in Vietnam, in the form of syrup, jam, and wine, which are very good nutritional products for health. Lai and co workers reported that sim fruits contain a low level of total protein ($4.00 \pm 0.12\%$ DW). The sim fruit was found to have a high concentration of total dietary fiber ($66.56 \pm 2.31\%$ DW). The most insoluble fiber found in sim fruit is cellulose, which contributed to about 50% of the insoluble dietary fiber. The most abundant fatty acids in sim fruit were linoleic 75.36% and palmitic 10.45% of total fatty acids, respectively [22].

Although there were many studies reported on the extracts of root, leaves and fruits but few studies were reported on sim flowers in the literature. Sim flower blooms in early summer,

the scent of Sim flower is very gentle and faint. Perhaps the essential oil content in sim flower is low and difficult to extract it is not available in the market. In view of this we made an attempt to prepare the scent.

The aim of this study is to reproduce the scent of Sim flower from natural substances present in Vietnam to replace the scent extracted from Sim flower.

2. MATERIALS AND METHODS

2.1 Materials are Used to Prepare the Fragrance

Essential oils: Ginger oil, Palmarosa oil, Orange oil, Grapefruit oil, Lemon oil, Mandarin oil, Lime oil, Lemongrass oil are obtained from the food chemistry laboratory of the College of Industry and Trade of Ho Chi Minh City.

Cinnamon bark oil, Basil oil, Coriander oil, Dill oil, Marjoram oil, Peppermint oil, Nutmeg oil, Pepper oil, Pimento oil, are entrained by steam distilled in the laboratory from raw materials in Vietnam.

Aromatic substances: Citral diethyl acetal, Eugenol, Isoeugenol, anisic aldehydes, Cinnamaldehyde, Linalool, Linalyl acetate, Linalyl cinnamate, Linalyl formate, Linalyl butyrate, Citronellal, Citronellol, Geraniol, Hydroxy citronellal, Geranyl acetate, Geronanyl butyrate, Geronanyl butyrate acetate, Citronellyl butyrate, Citronellyl formate, Ionone, Methyl ionone, Menthol, Limonene, Methylheptenone taken from the Vietnamese essential oil project, are extracted and synthesized from plant sources in Vietnam. All ingredients used in the formulation follow the flavoring standards used in food.

2.2 Products from Sim Fruit are Used of the Fragrance of Sim Flowers

Syrup, jam, and wine products available in the market are made from wild Sim fruit growing in Phu Quoc Island, Vietnam.



Fig. 1. Flower and fruit Sim [23]

2.3 Method of Preparation and Assessment Odor

To select the best fragrance combination and evaluate the quality of the scent, we have followed the method of the international experts of the project VIE86033 training [24]. The structure of the fragrance in this experiment included the Top notes and the Body note group.

Selection of aromatic substances similar to the scent of Sim flowers to form the main group, with the initial recipe on a small scale about of 10g. The ingredients were mixed according to the original preliminary formula, heated at 50°C for 4 hours with a magnetic stirrer, then left at room temperature for 72 hours to assess the fragrance. The aroma was diluted 20 times with an odorless diethyl phthalate (DEP) solvent, followed by a special scent paper and the sense of the nose to identify the fragrance.

After evaluation necessary measures were taken to add or remove the ingredients as per the desired quality aimed for. Further, the experiment was continued until the desired result is obtained and then proceeded with a large scale (100 g) and finally subjected to fragrance test of the product obtained.

2.4 Fragrance Test

The fragrance was tested on syrup product 0.2%, jam 0.5%, wine 0.3% by weight.

3. RESULTS AND DISCUSSION

After the experiment, we have selected fragrances FW.1, FW.2 for Sim wine, FS.1 and FS.2 for Sim syrup, FJ.1 and FJ.2 for Sim jam (Table 1.).

We have selected Lilacs, Carnation with a gentle and seductive natural scent for Top note of Sim flower scent. Terpineol is the main constituent of lilacs flower scent selected for FW.1, FS.1, FJ.1. Eugenol, Isoeugenol is the main constituent of the carnation flower scent selected for FW.2, FS.2, FJ.2. The role of the Top Notes group is to make it easier for the olfactory to recognize a fragrance. We have selected the Top Note with 3% weight in order to not affect the aroma of the main group.

The main aroma of Sim flower is made up of Aldehyde anisic, Cinnamaldehyde, Cinnamon bark oil, Linalool, Linalyl acetate, Linalyl cinnamate, Linalyl formate, Linalyl butyrate. We have selected these components with 50-70%

Table 1. The composition of sim flower odor

N°	Material	Fragrances % weight						Note
		FW.1	FW.2	FS.1	FS.2	FJ.1	FJ.2	
1	Terpineol	3		3		3		Top note
2	Eugenol		2		2		2	
3	Isoeugenol		1		1		1	
4	Aldehyde anisic	50	45	40	35	30	25	
5	Cinnamaldehyde		5		8		11	
6	Cinnamon bark oil		2		2		2	
7	Linalool	3	4	5	6	7	8	
8	Linalyl acetate	2		4		5		
9	Linalyl cinnamate	2		4		5		
10	Linalyl formate	2		3		5		Body note
11	Linalyl butyrate	1		3		5		
12	Citronellal		2		3		4	
13	Citronellol		1		3		4	
14	Geraniol		1		2		3	
15	Hydroxy citronellal	1	1	2	2	4	4	
16	Geranyl acetate	1	1	1	1	1	1	
17	Geranyl butyrate	1	1	1	1	1	1	
18	Geranyl formate	2	2	2	2	2	2	
19	Citronellyl acetate	1	1	1	1	1	1	
20	Citronellyl butyrate	2	2	2	2	2	2	
21	Citronellyl formate	1	1	1	1	1	1	
22	Ionone	1	1	1	1	1	1	
23	Methyl ionone	1	1	1	1	1	1	
24	Menthol	1	1	1	1	1	1	
25	Limonene	1	1	1	1	1	1	
26	Methylheptenone	2	2	2	2	2	2	
27	Citral diethyl acetal	1	1	1	1	1	1	
28	Ginger oil	1	1	1	1	1	1	
29	Basil oil	1	1	1	1	1	1	
30	Palmarosa oil	1	1	1	1	1	1	
31	Orange oil	1	1	1	1	1	1	
32	Grapefruit oil	2	2	2	2	2	2	
33	Lemon oil	3	3	3	3	3	3	
34	Mandarin oil	2	2	2	2	2	2	
35	Lime oil	2	2	2	2	2	2	
36	Coriander oil	1	1	1	1	1	1	
37	Dill oil	1	1	1	1	1	1	
38	Marjoram oil	1	1	1	1	1	1	
39	Peppermint oil	1	1	1	1	1	1	
40	Nutmeg oil	1	1	1	1	1	1	
41	Pepper oil	1	1	1	1	1	1	
42	Pimento oil	1	1	1	1	1	1	
43	Lemongrass oil	1	1	1	1	1	1	
	Total	100	100	100	100	100	100	

weight for the main fragrance. Aldehyde anisic and Linalool are the main constituents that determine the aroma of Sim flower.

Aldehyde anisic scent has a sweet , herbaceous odour. We chose Aldehyde anisic for different

Sim flower scents, 45-50% weight for Sim wine, 35-40% for syrup and 25-30% for jam.

The Cinnamaldehyde and Cinnamon bark oil have a warm-spicy sweet odor. We added in FW.2, FS.2, FJ.2. to create a warm, attractive smell of Sim flower. We have selected these

components with 7-13% weight for FW.2, FS.2, FJ.2.

Substances with a rose scent such as Citronellol, Geraniol, Geranyl acetate, Geranyl butyrate, Geranyl formate, Citronellyl acetate, Citronellyl butyrate, Citronellyl formate, Palmarosa oil and violet scent like Ionone, Methyl ionone help to enhance the fragrance of the Sim flower. We have selected these components with 30-40% weight.

The aroma of fruits such as Orange oil, Grapefruit oil, Lemon oil, Mandarin oil, Lime oil, Limonene, Methylheptenone, Citral diethyl acetal helps to enhance the properties and quality of the scent. The substances with herbal odor as Lemongrass oil, Marjoram oil help to enhance the natural odor of the Sim flower. The spicy odor of Pepper oil, Pimento oil makes Sim flower aroma warmer and more attractive.

4. CONCLUSION

From natural materials in Vietnam, we have formulated the scent of Sim flower for Sim wine FW.1, FW.2, for Sim syrup FS.1, FS.2 and Sim jam FJ.1, FJ.2. Sim flower FW.1, FS.1, FJ.1 are natural, gentle and attractive scent. Sim flower FW.2, FS.2, FJ.2 are natural, warm and attractive fragrances.

Sim flower FW.1, FW.2, FS.1, FS.2, FJ.1, and FJ.2 are added to Sim wine, Sim syrup, Sim jam to increase the value and appeal of the products made from Vietnam Sim fruit.

We have formulated the scent of Sim flower from natural materials in Vietnam for Sim wine FW.1, FW.2, for Sim syrup FS.1, FS.2 and Sim jam FJ.1, FJ.2. Sim flower FW.1, FS.1, FJ.1 are natural, gentle and attractive scent. Sim flower FW.2, FS.2, FJ.2 are natural, warm and attractive fragrances. Sim flower FW.1, FW.2, FS.1, FS.2, FJ.1, and FJ.2 are added to Sim wine, Sim syrup, Sim jam to increase the value and appeal of the products made from Vietnam Sim fruit.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Yun-ting C, Hua-wei G. Chemical constituents from the roots of *Rhodomyrtus tomentosa*. Journal of Chinese medicinal materials. 2016;39(6):1303-7.
2. Grace FO, Kitiya V, Supayang PV. Use of *Rhodomyrtus tomentosa* ethanolic leaf extract for the bio-control of listeria monocytogenes post-cooking contamination in cooked chicken meat. Journal of Food Science and Technology. 2016;53:4234–4243.
3. Hong-Xin L, Wei-Min Z, Zhi-Fang X, Yu-Chan C, Hai-Bo T, Sheng-Xiang Q. Isolation, synthesis, and biological activity of tomentosol a from the leaves of *Rhodomyrtus tomentosa*. RSC Advances. 2016;6:25882-25886. DOI: 10.1039/C6RA01594H
4. Asadhawut H, Wilawan M. New acylphloroglucinols from the leaves of *Rhodomyrtus tomentosa*. Tetrahedron. 2008;64(49):11193-11197.
5. Cui C, Zhang S, You L, Ren J, Luo W, Chen W, Zhao M. Antioxidant capacity of anthocyanins from *Rhodomyrtus tomentosa* (ait.) and identification of the major anthocyanins. Food Chem. 2013;139:1-8.
6. Wu P, Deng Q, Ma G, Li N, Yin Y, Zhu B, Chen M, Huang R. Spray-drying of *Rhodomyrtus tomentosa* (Ait.) Hassk. flavonoids extract: optimization, physicochemical, morphological, and antioxidant properties. Inter. J. of Food Sci. 2014;2014:1-11. Available:<http://dx.doi.org/10.1155/2014/420908>
7. Hazrulrizawati A H, Roziyahira M, Mashitah Y. *Rhodomyrtus tomentosa*: a phytochemical and pharmacological review. Asian Journal of Pharmaceutical and Clinical Research. 2017;10(1):10-16. DOI: 10.22159/ajpcr.2017.v10i1.12773
8. Dachriyanus SMV, Sargent BW, Skelton IS, Sutisna M, White AH, Yulinah E. Rhodomyrtone, an antibiotic from *Rhodomyrtus tomentosa*. Australian Journal of Chemistry. 2002;55(3):229–232.
9. Limsuwan S, Trip EN, Kouwen TRHM et al. Rhodomyrtone: a new candidate as natural antibacterial drug from *Rhodomyrtus tomentosa*. Phytomedicine. 2009;16:645–651.

10. Saising J, Hiranrat A, Mahabusarakam W, Ongsakul M, Voravuthikunchai SP. Rhodomertone from *Rhodomyrtus tomentosa* (Aiton) Hassk as a natural antibiotic for staphylococcal cutaneous infections. *Journal of Health Science*. 2008;54:589–595.
11. Saising J, Ongsakul M, Voravuthikunchai SP. *Rhodomyrtus tomentosa* (Aiton) Hassk. Ethanol extract and rhodomertone: a potential strategy for the treatment of biofilm-forming staphylococci. *Journal of Medical Microbiology*. 2011;60:1793–1800.
12. Nojima J, Murakami T, Kiso A. Piceatannol 4'-O- β -D-glucopyranoside for antioxidants, antiinflammation agents, skin-lightening agents, antiaging agents, tyrosinase inhibitors, and skin cosmetics. *Jpn. Kokai Tokkyo Koho*. 2007;JP2007223919 A 20070906.
13. Thanh SV, Dai HN. *Rhodomyrtus tomentosa* (Aiton) Hassk and its biological. *Indian Journal of Drugs*. 2018;6(4):223-228.
14. Loi DT. Vietnamese medicinal plants and herbs. Publishing scientific and technical. 1981; 448-449.
15. Huong DTV. Studying the chemical components and bioactivities of rhodomertus tomentosa extracts. *VNU Journal of Science: Natural Sciences and Technology*. 2019;35(1):76-82.
16. Thuy NM. Stabilizing and enhancing the quality of sim wine by chemical and biological methods. *Journal of Science, Can Tho University*. 2010;165.
17. Hoang Thi LTH. Study on the chemical composition and microbiology of sim wine collected in Con Lon commune, Na Hang district, Tuyen Quang province. *Scientific Journal of Tan Trao University*. 2020;6(17):104-110.
18. Hoang TY, Trinh TTL, Mai CT, Nguyen TTH, Lai TNH, Bui VN. Optimization of extraction of phenolic compounds that have high antioxidant activity from *Rhodomyrtus tomentosa* (ait.) Hassk. (sim) in chi linh, Hai Duong. *Journal of Biology*. 2015;37(4):509-519
19. Le PH, Anh HP, Van V, Man L. Effects of core/wall ratio and inlet temperature on the retention of antioxidant compounds during the spray drying of Sim (*Rhodomyrtus tomentosa*) juice. *Journal of Food Processing and Preservation*. 2015;39: 2088-2095.
20. Lai TN, Herent MF, Quetin-Leclercq J, Nguyen TB, Rogez H, Larondelle Y, André CM. Piceatannol, a potent bioactive stilbene, as major phenolic component in *Rhodomyrtus tomentosa*. *Food Chemistry*. 2013;138:1421-1430.
21. Tung NH, Ding Y, Choi EM, Van KP, Van M C, Kim YH. New anthracene glycosides from *Rhodomyrtus tomentosa* stimulate osteoblastic differentiation of MC3T3-E1 cells. *Arch Pharm Res*. 2013;32:515-520.
22. Lai T NH, Andre C, Rogez H, Mignolet E, Thi BTN, et al. Nutritional composition and antioxidant properties of the sim fruit (*Rhodomyrtus tomentosa*). *Food Chemistry*. 2015;168:410-416. Available: <http://hdl.handle.net/2078.1/156442> DOI: 10.1016/j.foodchem.2014.07.081
23. Purple Sim has become a beautiful bonsai to hunt. Available: <https://rauxanh.net/cay-hoa-sim/Cay canh> (27/1/2021)
24. Jain S. Processing of Vietnam eseessential oils and related natural products, DP.VIE 86033. 1998;40. Available: <https://doi.org/10.51453/2354-1431/2020/382>

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