# Sensory Evaluation of a Perfume Made of Orange Essential Oil

Keneddy Carranza, Ciro Rodriguez, Doris Esenarro, Maria Veliz, and Jennifer Arteaga

Abstract—This research paper addresses the sensory evaluation of a perfume made from orange essential oil, considering the sensory acceptance of a panel of experts. The methodology used gives as sample size eight formulations that were prepared and tested hedonically with ten experts in the field using the instrument on the evaluation sheet that represents five scales of smell references. The evaluation suggests that the most sensorial accepted and elaborated perfume formulation based on orange essential oil should be composed of alcohol (7.1 ml), orange essential oil (1.56 ml), lemon essential oil (0.226 ml), essential oil of cinnamon (0.113 ml) and bergamot essential oil (0.113 ml). The results obtained in the development of the sensory evaluation can conclude that the formulation (F8) is more sensorial accepted.

Index Terms—Sensory evaluation, essential oil, orange essential.

## I. INTRODUCTION

Sensory evaluations are proposed strategies for the collection of information and subsequent treatment, in a food or non-food product [1], on the other hand, the development of cosmetic products has increased in recent years and before new products are proposed as perfumes and their sensory products evaluation [2]. Citrus fruits by their nature are rich in chemical compounds for the food and perfume industry, which has been studied in recent years [3].

As of 2017, the growth of perfume sales is increasing by 8%, which leads to the demand for perfumes and, therefore, to the development of new perfumes [4].

The methodology consists of fixing substances, combining them, determining the number of tests (formulations) and determining the most sensorial accepted formulation.

As a result, it was obtained that the formulation (F8) is the most sensory accepted, which is composed of alcohol (7.1 ml), orange essential oil (1.56 ml), lemon essential oil (0.226 ml), cinnamon essential oil (0.113 ml) and bergamot essential oil (0.113 ml).

## II. METHOD

Space study field: It is located in the laboratory of the

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Keneddy Carranza is with National University Federico Villarreal Lima, Peru (e-mail: carraxa@gmail.com).

Ciro Rodriguez is with National University Mayor de San Marcos, Peru (e-mail: crodriguez@unfv.edu.pe).

Doris Esenarro and Maria Veliz are with Specialized Institute for Ecosystems and Natural Resources Research (INERN) UNFV, Peru (e-mail: desenarro@unfv.edu.pe, maveliz@unfv.edu.pe).

Jennifer Arteaga is with Peruvian University of Ciencias Aplicadas (UPC), Lima, Peru (e-mail: U20151C024@upc.edu.pe).

Professional School of Agroindustrial Engineering, at the National University Federico Villarreal - City of Lima-Peru.

Unit of analysis, who studies: This study is based on the evaluation of the panel of experts. Instrument: Evaluation sheet.

## III. MATERIALS

- Orange essential oil
- Bergamot essential oil
- Cinnamon essential oil
- Alcohol
- 100 ml bottles
- Test tube
- Pipette

## IV. RESULTS

After considering the 5 factors (A=Alcohol, and essential oils of B=Orange, C=Lemon, D=Cinnamon, E=Bergamot) in the Taguchi test methodology, the L8 octagonal arrangement was used, which involves running 8 experimental conditions or formulations (F).

From the survey made to the panel of experts (n=10) who evaluated the scent of the 8 formulations and the following data was obtained to be treated for the analysis:



The analysis of the results can be done in two different ways as can be seen in the results of the Table I and Table II. One of them through the analysis of variance, the other through a series of graphs; In the present investigation, we will choose to perform the analysis of variance.

A. Variance Analysis

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	TABLI	E I: Ac	CEPTA	BILITY	Y TEST	SCOR	ES	
	Sme	11						
Panelist	F1	F2	F3	F4	F5	F6	F7	F8
1	5	4	1	1	2	3	4	1
2	4	3	3	3	3	4	5	3
3	4	2	4	4	3	4	4	3
4	4	3	2	4	1	4	3	4
5	5	3	4	4	4	4	2	5

TABLE II: ACCEPTABILITY TEST SCORES D Ν A в C Е e2 Alcohol Orange Lemon Cinnamon Bergamota e1 7,1 ml 1,56 ml 0,226 ml 0,113 ml 0,113 ml 1 1 1 1 1 1 1 1 2 1 1 1 2 2 2 2 7,1 ml 1,56 ml 0,226 ml 0,201 ml 0,212 ml 3 1 2 2 1 1 2 2 7,1 ml 2,26 ml 0,311 ml 0,113 ml 0,113 ml 4 1 2 2 2 2 1 1 7,1 ml 2,26 ml 0,311 ml 0,201 ml 0,212 ml 5 2 1 2 1 2 1 2 9,04 ml 1,56 ml 0,311 ml 0,113 ml 0,212 ml 6 2 1 2 2 2 9.04 ml 1.56 ml 0.311 ml 0.201 ml 0.113 ml 1 1 7 2 2 2 2 9,04 ml 2,26 ml 0,226 ml 0,113 ml 0,212 ml 1 1 1 8 2 2 1 2 1 1 2 9,04 ml 2,26 ml 0,226 ml 0,201 ml 0,113 ml

It is observed that in Fig. 1, formulation obtains the highest score; therefore, this formulation has a more pleasant aroma than the others, with an average of 4.3 and a standard deviation of 0.48.

Given the results of the sensory evaluation (olfactory) in Table II, we can include it in the proposed model of the experimental design, and the following table is obtained:



Fig. 2. Factor behavior.

Fig. 2 shows the behavior of each factor at levels I and II, for each formulation.

The analysis of results can be done in two different ways. One of them by means of the analysis of variance, the other by means of a series of graphs; in the present investigation the analysis of variance was chosen.

## B. Analysis of Variance

The results of the response variables were obtained for each of the factor levels:

# C. Anova Construction

In the Fig. 2 and the Table III we can As a 95% confidence

level was established, any value below 5% is eliminated, passing this result to the sum of the error, but no percentages below 5% were found.

TABLE III: TOTAL SUM OF RESULTS BY LEVEL									
Factor	А	В	С	D	Е	e1	e2		
Level I	14,1	13,8	14,4	14,5	13,5	12,8	13,8		
Level II	12,4	12,7	12,3	13	13	13,7	12,7		
Sum	26,5	26,5	26,7	27,5	26,5	26,5	26,5		

TABL	E IV: Assign	MENT OF F.	ACTORS AND	RESULTS	OF SENSOR	Y TESTS
Effect	SS	Grade	V	Experi	%	Factor
		freedo		mental	contri	tablar
		m		factor	bution	Fisher
А	0,36125	1	0,36125	105,87	26,25	
В	0,15125	1	0,15125	44,33	10,99	
С	0,55125	1	0,55125	161,55	35,05	3,9708
D	0,28125	1	0,28125	82,43	20,44	
Е	0,03125	1	0,00341	38,47	7,27	
Error		74	0,00341			
Total		79				

To find the F value, the Fisher table was used, with  $\alpha = 0.05$ ; V1 = 1 and V2 = 74; for which the values have to be extrapolated as a combination of the Table III and Table IV.

TABLE V: A	Average
Х	Y
70	3,978
74	?
80	3,960

Therefore, the factor according to the Fisher table is 3, 9708.

In Fig. 3, the value of Fisher is represented.

It can be seen that all active factors exceed the value of 3.8848, so the experimental factor values are correct and accepted for the experiment.

The results of the response variables were obtained for each of the factor levels as show in Fig. 3; then, we will calculate the totals for each level of the 7 factors. As can be seen in the Fig. 4, the highest values of each formulation are alcohol (7.1 - 9.04 ml) and followed by orange essential oil (1.56-2.26 ml).



Fig. 3. Results per level.



Fig. 4. The factor according to the Fisher table is 3, 9708.

TABLE VI: AVERAGE FACTOR PER LEVEL (L8)							
Factor	А	В	С	D	Е	e1	e2
Level I	3,53	3,45	3,60	3,63	3,38	3,20	3,45
Level II	3,10	3,18	3,08	3,25	3,25	3,43	3,18

Table VI shows the average factor per level. It is observed that all active factors exceed the value of 3.8848, then the experimental factor values are correct and accepted for the experiment.

As a formulation that maximizes the sensory quality of the perfume is desired, the highest specific values are taken: A1 (3,53), B1 (3,45), C1 (3,60), D1 (3,63) y E1 (3,38).

With these results verify the orthogonal arrangement L8 in Fig. 5, identifying the experiment that matches this:



Fig. 5. Results per level.

Considering in table 7 the formulation (test) 1 exactly matches the calculated determination.

Therefore, the optimal formulation for perfume production

will be the one that is composed of:

A1 = 7.1 ml, B1 = 1.56 ml, C1 = 0.226 ml, D1 = 0.113 ml, E1 = 0.113 ml.

TABLE VII: VERIFICATI	ON OF THE ORTHOGONAL	ARRANGEMENT L8
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N °	А	В	С	D	Е	e1	e2
1	1	1	1	1	1	1	1
2	1	1	1	2	2	2	2
3	1	2	2	1	1	2	2
4	1	2	2	2	2	1	1
5	2	1	2	1	2	1	2
6	2	1	2	2	1	2	1
7	2	2	1	1	2	2	1
8	2	2	1	2	1	1	2

## V. DISCUSSION

According to the research of [5], they assured that a perfume is a mixture that obtains aromatic substances, being able to be essential oils, that in this investigation, the orange essential oil was used and had a considerable acceptance, agree with the authors. [6].

According to [7], he said that during the use of essential oils, it should be considered that no more than 20 essences should be used for a perfume, since it would be expensive and anti-ecological, in this research it was carried out with 4 elements Essential in total that showed acceptable results and lower costs were generated, according to the author. [8]

## VI. CONCLUSION

The smell of a perfume made from orange essential oil was sensory evaluated by determining that the optimal (most acceptable) formulation will be composed of alcohol (7.1 ml), orange essential oil (1.56 ml), lemon essential oil (0.226 ml), cinnamon essential oil (0.113 ml) and bergamot essential oil (0.113 ml). To determine this, 8 formulations or discarded tests of the Taguchi method and the most acceptable formulation by the panel of experts using a hedonic scale of one to five were required.

### CONFLICT OF INTEREST

The authors declare that we have no conflicts of interest.

## AUTHOR CONTRIBUTIONS

Keneddy Carranza carried out the research design; Keneddy Carranza and Ciro Rodriguez select the materials to experience, Keneddy Carranza and Doris Esenarro carried out the design of the Doris Esenarro and Maria Veliz's experimentation development and data analysis. We carried out the exploratory field study, the authors' contribution is reflected in all the research approved in its final version.

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**Keneddy Carranza** was born in Lima, 1992. He got his bachelor of engineering in agro industry, graduated at the National University Federico Villarreal, now he works in a food processing company.

His contribution includes experimentation development and data analysis.







**Maria Veliz** is a biologist with experience in planctology and evaluation of fishery resources, ecology, from the Universidad Nacional Mayor de San Marcos, a research professor, a candidate for a doctorate in environment and sustainable development.

Her contribution includes technologies.

Her contribution includes data analysis



Jennifer Arteaga is a research student at the Peruvian University of applied sciences and international trade management by the exporter's association. Her contribution is processing data.



His contribution includes supervision of the methodology used.

Doris Esenarro is a system engineer, a professor of

Faculty of Environmental Engineering of the

University Federico Villarreal, professor of the

Graduate School EUPG. Her research topics are

focused on the environmental pollution generated by

vehicles, sustainable ecotourism constructions and

renewable technologies.