MEDS Chinese Medicine (2024)
Clausius Scientific Press, Canada

DOI: 10.23977/medcm.2024.060301
ISSN 2616-1753 Vol. 6 Num. 3

Development Technology of Honeysuckle and Dandelion Compound Health Drink

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Keywords: Honeysuckle; Dandelion; Single Factor Experiment

Abstract: In this study, the Honeysuckle was used as the main raw material, supplemented by dandelion, rock sugar and citric acid, the optimum proportion of dandelion in the compound juice was determined by test analysis, and a certain amount of white sugar and citric acid were added to adjust the flavor and taste. The optimum range of each factor was determined by single factor experiment, and the optimum technological ratio of honeysuckle and dandelion compound health drink was determined by response surface method. A health drink with unique flavor, such as clearing heat and detoxifying, eliminating swelling and dispersing stasis, clearing throat and wetting throat, has been developed. On the basis of single factor test, Box-Behnken model was established and response surface method was used to optimize the optimum process conditions. The results showed that the best formula for sensory evaluation of honeysuckle and dandelion complex health drink was 1.23 g for honeysuckle, 0.86 g for dandelion and 0.02 g for citric acid. The overall score obtained under this condition is 92 points.

1. Introduction

With the improvement of people's living standards, the awareness of health care is more and more profound in people's brains, so the demand and sales of health care products are gradually increasing. At the same time, consumers' understanding of "health care products" is more and more objective and rational. With the rapid development of today's era, people's requirements for drinks are no longer limited to flavor and taste, but pay more attention to the process of food therapy, which is not only the pursuit of consumers, but also the pursuit of food production and distributors. If there is no innovation in drinks for a long time, it is difficult to ensure their competitiveness in the market. Compared with general drinks, health drinks have good health care effect, certain therapeutic effect, good tonic effect and pleasant flavor, which is also the reason for the rapid development of health drinks. In recent years, the vast majority of consumers are increasingly recognizing the health and safety of natural ingredients.

2. Research profile

2.1 Honeysuckle No

Honeysuckle alias two flowers, double flowers, etc., belong to the former Ministry of Health issued the "medicine and food homology". Honeysuckle contains organic acids, volatile oil, ring ether terpenoids and other chemical components. According to the survey, one third of the traditional Chinese medicine prescriptions used honeysuckle. Honeysuckle is known as "spectrum antibiotics", "penicillin in Chinese medicine", "Chinese medicine antibiotics" and so on[1]. It has antibacterial, antiviral, anti-allergy, lower blood lipid, antioxidant, anti-tumor and other effects[2]. Honeysuckle is one of the commonly used bulk herbs in China. The beverage products have the effects of clearing heat and relieving heat, clearing heat and brightening eyes. According to the principle of prescription compatibility, a variety of honeysuckle preparations have been developed, which have the treatment of pharyngitis, oral ulcer, upper respiratory tract infection and other diseases. Honeysuckle preparation has expanded its clinical application scope. Honeysuckle mainly as tea, beverage, but also can do wine, yogurt, health food. Therefore, the deep processing technology of Honeysuckle industry varies according to different application fields[3], gradually evolving from a single Chinese medicinal herb to daily chemical products such as beverages, health liquor, and toothpaste.

2.2 The dandelion

Dandelion, also known as yellow flower groundcherry, yellow flower seedlings, yellow flower Sanqi grass, etc., belongs to a medicinal and edible plant with the same origin. It contains various essential amino acids and minerals as essential nutrients for human body. In addition, dandelion also contains important active ingredients such as flavonoids[4], polysaccharides, and terpenoids[5], which have the effects of reducing blood sugar[6], anti-inflammatory[7], and reducing blood lipids.

2.3 Rock sugar

Rock sugar is the crystallization of white granulated sugar. It is a crystalline sugar made of sucrose and protein raw material formula, and recrystallization after redissolution and clean treatment. According to traditional Chinese medicine, rock sugar has the function of moistening lung, relieving cough, clearing phlegm and removing fire[8]. Widely used in food, pharmaceutical industry manufacturing high-grade supplements, health care products, etc. The elderly contain rock sugar, which can also reduce dry mouth. Secondly, rock sugar can supplement the water and sugar in the body, and has the function of supplementing body fluids, supplying energy, supplementing blood sugar, and detoxification.

2.4 And the citric acid

Citric acid is an important edible organic acid, which is an additive of beverage, canned food and other food. Appropriate amount of citric acid can enhance the metabolism in the human body. It can be used as a flavor regulator to adjust the sugar-acid ratio of products in some products to improve the flavor of products; as a color protector for fruit and vegetables; as a pH regulator, citric acid in canned, jam, jelly and inhibit the propagation of corrupt microorganisms[9]. Using citric acid to adjust the pH can also improve quality and increase flavor.

3. Materials and Methods

3.1 Materials and instruments

Materials: Honeysuckle (made from Fengqiu, Henan province, purchased from Bozhou Kangmei medicine market); dandelion (taken from the campus flower bed of Bozhou University); rock sugar (purchased from Gaishengxiang supermarket); citric acid (taken from the food laboratory of Bozhou University, food grade).

Instrument: analytical balance ME 2.04 million; constant temperature water bath HH-6; electromagnetic mixer; tea set; tea bag.

3.2 Experimental method

3.2.1 Process flow

Preparation of honeysuckle juice: select, dry, crush and filter honeysuckle extraction liquid.

Preparation of dandelion juice: wash, dry, filter and extract centrifugal dandelion juice.

Preparation of compound beverage: mixing, filtration, homogenization, degassing sterilization cooling packaging sterilization cooling inspection finished products[10].

3.2.2 Operation key points

3.2.2.1 The preparation of honeysuckle juice

(1) Material selection: choose relatively complete, thick slightly hard honeysuckle.(2) Cleaning: wash honeysuckle with warm water, remove surface impurities, etc., and drain.(3) weighing: the drained honeysuckle for weighing, called honeysuckle respectively.

(4) crushing: with a tamping machine to crush honeysuckle into powder, in order to improve the juice rate of extraction.(5) Heat preservation extraction: put the powdered honeysuckle in the container and add water, the material to water ratio 1:12 in the constant temperature water bath, the extraction temperature is 90℃, after 0.5 h, use four layers of gauze to obtain juice, extract the residue with three times water again for 0.5 h, mix the sap twice for reserve.(6) Filter: the extract can be filtered to get honeysuckle juice reserve.

3.2.2.2 Preparation of the dandelion juice

(1) Material selection: choose a large and clean leaves, slightly fragrant dandelion.(2) Cleaning: repeatedly scrub with flowing water to remove the sediment attached to the dandelion.(3) Dry: the cleaned dandelion is dried.(4) weighing: weigh the dried dandelion and weigh the dandelion respectively.(5) Pre-cooking: put the dandelion into a beaker on the electric stove for pre-cooking. The conditional water ratio is 1:10; the temperature is 85-90℃; 15 min and four layers of gauze to obtain dandelion juice.

3.2.2.3 Mixed and blending

Mix the honeysuckle juice, dandelion juice and citric acid evenly according to different levels. Based on sensory evaluation, single factor experiment and response surface experiment were used to determine the optimal ratio of flavor compound health drinks.

3.2.2.4 Sterilization

By pasteurization, the sterilization temperature was 70℃ and the sterilization time was 30 min.

3.2.3 Sensory Assessment

In order to determine the amount of honeysuckle, dandelion, rock sugar, citric acid added to the product quality, this subject with single factor experiment and response surface experiment method, select 20 Bozhou college outside the masses (in different ages) as a raters, according to the sensory appraisal standard of the product appearance, color, fragrance, taste, organization, primary evaluation, with 100 standard, take the average as the score result[11]. Code of points[11]See Table 1.

Table 1: The sensory scoring criteria

Project	Sensory standards	Score / score
Color 20 points	Uniform color, the color is uniform yellow-green	15-20
	The color is uneven, appear darker or more light	10-14
	The color is improper and uneven	0-9
The uniformity is 30 points	The tissue is uniform, delicate, no precipitation, no stratification	20-30
	Slightly layered, with a little precipitation	10-19
	Significant stratification, with more precipitation	0-9
The smell is 20 points	Honeysuckle and dandelion aroma, and soft smell	15-20
	Honeysuckle and dandelion aroma, but the smell is not soft	10-14
	Only one aroma of honeysuckle or dandelion	0-9
	Honeysuckle and dandelion taste, soft and sour taste is very good	20-30
Taste (30 points)	The taste is general	10-19
	Only honeysuckle or dandelion a taste, the taste of softness is poor	0-9

3.3 Single-factor experimental design

3.3.1 Design of the influence of honeysuckle addition on the sensory assessment of combined tea

Under the conditions of 0.6 g of dandelion, 0.05 g, 0.3 g, 0.6 g, 0.9 g, 1.2 g, 1.5 g and 1.8 g of citric acid and 1 g.

3.3.2 Design of the influence of dandelion addition amount on the sensory assessment of combined tea

Univariate experiments were designed with dandelion supplementation of 0.3 g, 0.6 g, 0.6 g, 0.9 g, 1.2 g, 1.5 g and 1.5 g.

3.3.3 Design of the influence of citric acid addition on the sensory assessment of combined tea

In the content of 1.2 g, 1.2 g, 0.02 g, 0.02 g, 0.02 g, 0.02 g, 0.03 g, 0.04 g and 0.05 g.

3.4 Experimental design of the response surface

3.4.1 Experimental factor level of the response surface

Based on the results of single-factor experiment, the independent variable selected the three factors: the amount of honeysuckle (A), dandelion (B), and the amount of citric acid (C), and the response value was sensory score (Y). The design response surface test is based on Box-Behnken, and the following response surface test factor level coding is shown in Table 2.

Table 2: The factor level of the response surface

Horizontal	Add the amount of honeysuckle / g	Amount of dandelion addition / g	Amount of citrate acid added to / g
-1	0.9	0.6	0.01
0	1.2	0.9	0.02
1	1.5	1.2	0.03

3.4.2 Experimental design of response surface optimization

Select the horizontal segment with great influence of addition on the sensory evaluation and optimize it according to the test results, and then perform the verification test to obtain the optimal results. According to the conditions of the software design, the test was conducted to determine the sensory score of the composite health beverage under different conditions. The test design and results are shown in Table 3.

Table 3: Response surface design scheme and test results factors

Test number	A	B	C	Sensory score / Score
1	0.90	0.6	0.02	69
2	1.50	0.60	0.02	79
3	0.90	1.20	0.02	75
4	1.50	1.20	0.02	69
5	0.90	0.90	0.01	75
6	1.50	0.90	0.01	82
7	0.90	0.90	0.03	79
8	1.50	0.90	0.03	76
9	1.20	0.60	0.01	84
10	1.20	1.20	0.01	72
11	1.20	0.60	0.03	74
12	1.20	1.20	0.03	79
13	1.20	0.90	0.02	91
14	1.20	0.90	0.02	93
15	1.20	0.90	0.02	92
16	1.20	0.90	0.02	91
17	1.20	0.90	0.02	92

4. Results and analysis

4.1 Results of the one-factor experimental design

4.1.1 Influence of the added amount of honeysuckle on the sensory assessment of the combined tea

As can be seen from Figure 1 below, under the premise of a certain amount of dandelion and citric acid, the amount of honeysuckle will be gradually increased, the fragrance of honeysuckle in combined tea will gradually increase, and the sensory evaluation score of combined tea will also increase. When the amount of honeysuckle is 1.2 g, the combined tea has strong tea and uniform color; if the honeysuckle is added, the fragrance of honeysuckle in combined flowers will be more intense, and the sensory score will drop accordingly.

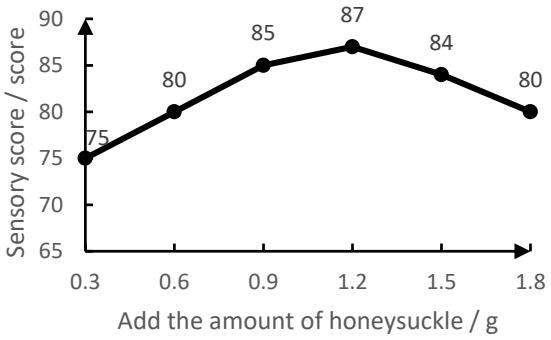

Figure 1: Effect of honeysuckle addition on sensory scores

4.1.2 Influence of dandelion additive amount on the sensory assessment of combined tea

From the Figure 2, to add honeysuckle, citric acid on the basis of a certain amount, gradually increase dandelion content, compound health beverage sensory rating score will increase, in dandelion add 0.9 g, combination of tea tea rich, uniform color, then continue to add dandelion, sensory score will drop.

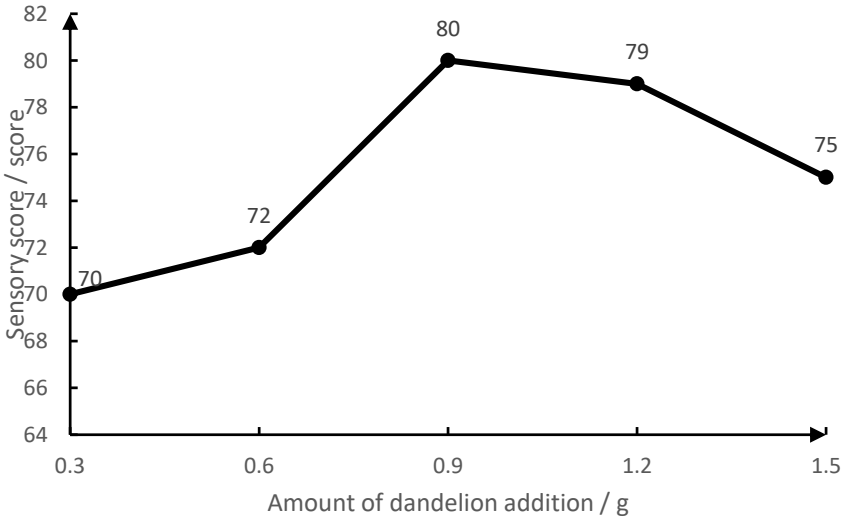

Figure 2: Effect of dandelion addition amount on sensory scores

4.1.3 Effect of citric acid addition on the sensory assessment of combined tea

As can be seen from Figure 3 below, under the premise of honeysuckle, dandelion and certain amount, with the increase of citric acid added, the sensory evaluation score of combined tea will also increase. When the amount of citric acid added is 0.02 g, the sensory score is maximum, and then citric acid is added, the sensory score will decrease[13].

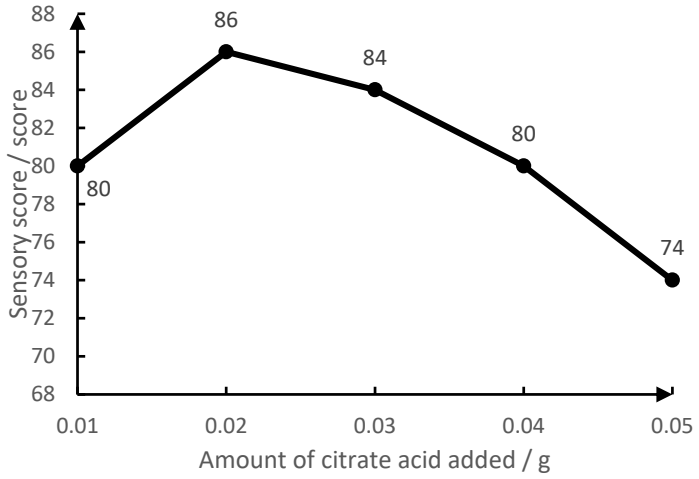

Figure 3: Effect of addition of citric acid on sensory assessment

4.2 Experimental results of response surface optimization

The optimization was 1.23 g honeysuckle, 0.86 g dandelion and 0.02 g citric acid, and the sensory score of compound health drinks was 92.

4.3 Response surface modeling and analysis of variance

The response surface software was used to analyze the experimental data, and to obtain a secondary regression equation model between the sensory score and the amount of honeysuckle, dandelion and citric acid:

$Y=91.80+1.00A-1.38B-0.63C-4.00AB-2.50AC+4.25BC-9.03A^2-9.77B^2-4.78C^2$

Table 4: Analysis of variance table

Source of variation	Quadratic sum	Free degree	Mean square	F price	P price	Conspicuousness
Model	1117.48	9	124.16	214.61	<0.0001	**
A	8.00	1	8.00	13.83	0.0075	**
B	15.13	1	15.13	26.14	0.0014	**
C	3.13	1	3.13	5.40	0.0531	
AB	64.00	1	64.00	110.62	<0.0001	**
AC	25.00	1	25.00	43.21	0.0003	**
BC	72.25	1	72.25	124.88	<0.0001	**
A^2	342.95	1	342.95	592.75	<0.0001	**
B^2	402.32	1	402.32	695.37	<0.0001	**
C^2	96.00	1	96.00	165.93	<0.0001	**
Residual	4.05	7	0.58			

Unplanned item	1.25	3	0.42	0.60	0.6507	
Pure error	2.80	4	0.70			
Sum	1121.53	16				

Pour: R^2= 0.9964, R^2A d j =0.9917; "* *" (P 0.01) indicates significant influence on the response value; "*" (P 0.05) indicates significant influence on the response value.

The ANOVA results of the regression equation are shown in Table 4. As can be seen from Table 4, the F value of the regression model is 214.61, P <0.0001, indicating that the regression model difference is extremely significant; the P value of the misfitting term is 0.6507> 0.05, indicating that the reliability of the equation is fully proved; the regression coefficient R2Is 99.64%> 85%, indicating that the regression equation replaces the trial true point. The data from Table 4 show that the test error is small and in line with the actual situation, and can be used to analyze the test results.

According to the P-values in Table 4, the effects of honeysuckle (A) and dandelion (B) on the sensory score, while citric acid (C) was not significant; in the interaction term, AB, BC and AC on the sensory score, and the secondary item had a significant effect on the sensory score. According to the size of F value in Table 4, it can be concluded that the order of three factors influencing the sensory score of beverage is dandelion (B)> honeysuckle (A)> citric acid (C).

4.4 Interaction influence and contour map analysis

The response surface diagram can directly reflect the influence of the two variables on the dependent variables. The resulting response surface diagram, the steeper the slope, the closer the contour line is to the ellipse, indicating the greater the interaction between the two. The contour density also reflects the extent to which this factor influences the sensory scores[14]. Based on the results of the analysis of variance of the regression model, the response surface map and contour plot were drawn to analyze the effect of honeysuckle, dandelion and citric acid on the response value of the beverage. When fixing one of the three factors of honeysuckle, dandelion, and citric acid, the contour plot and response surface plot can be used to reflect the effect of the interaction between the other two factors on the sensory score. The results are shown in Figures 4 to Figures 9.

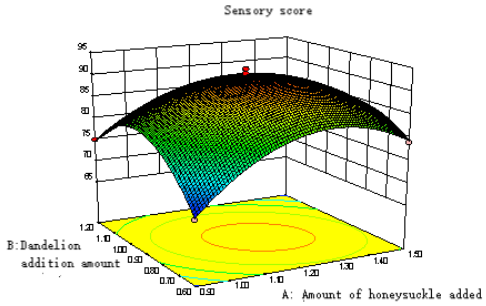

Figure 4: Response surface diagram of the effect of dandelion addition on sensory assessment

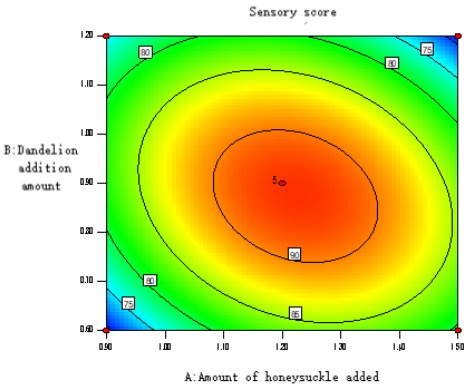

Figure 5: Contour plot of the effect of honeysuckle dandelion additive amount interaction on sensory scores

According to Figure 4 and Figure 5, in the case of fixed factor citrate acid addition (C), when the addition amount of honeysuckle and dandelion was gradually increased, the sensory score showed a trend of gradually rising first and then gradually stabilizing. The sensory score was in the higher range at additions of 0.9 g–1.5 g for honeysuckle and 0.6 g–1.2 g for dandelion.

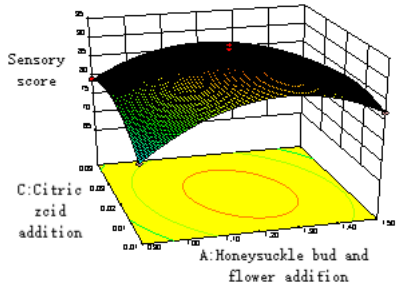

Figure 6: Response profile of the interaction of citrate addition on sensory scoring

From Figure 5 and Figure 6, in the case of fixed factor dandelion addition (B), when the amount of honeysuckle addition and citric acid addition gradually increased, the change trend of sensory score increased first and then decreased. Higher sensory scores appeared at 0.9 g-1.5 g of honeysuckle supplementation and citric acid supplementation at 0.01 g-0.03 g. Figure shows that the interaction of the amount of citrate added in honeysuckle had no significant effect on the sensory score.

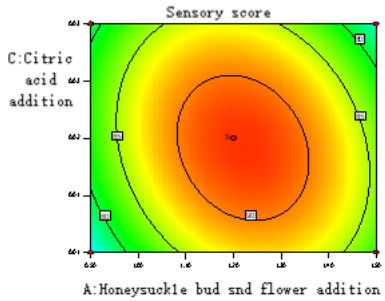

Figure 7: Contour plot of the effect of honeysuckle citrate addition interaction on sensory scores

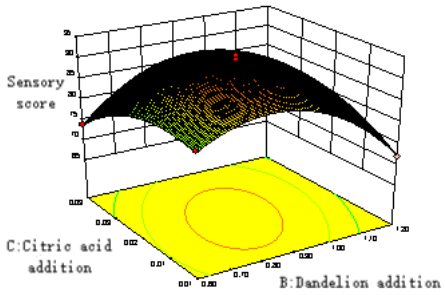

Figure 8: Response surface of the effect of dandelion citrate addition on sensory scores

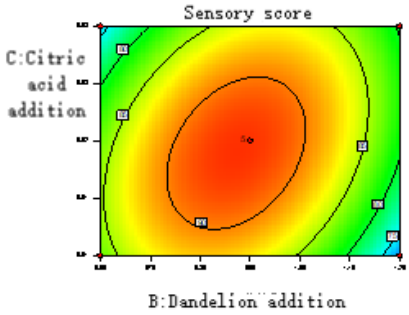

Figure 9: Contour plot of the effect of dandelion citrate addition amount interaction on sensory scores

According to Figure 8 and Figure 9, the interaction of the amount of citric acid added in dandelion has the greatest influence on the sensory score. Under the fixed factor of the amount of honeysuckle added (A), when the amount of dandelion added and citric acid is gradually increased, the sensory score gradually increases and then tends to stabilize. From Figure 7, the amount of dandelion was 0.6 g to 1.2 g, and citric rate was 0.01 g to 0.03 g.

5. Conclusions

Beverage diversification, health, health, tonic is the development trend of future drinks, with sensory score value as an index, through the single factor test, on this basis, the response method optimization to determine the optimal formula: honeysuckle dandelion 1.23 g, dandelion 0.86 g, citric acid is 0.02 g, under the condition of the compound health beverage sensory score is 92 points.

In this study, with honeysuckle as the main raw material, supplemented by dandelion, rock sugar and citric acid, we developed health drinks with heat and detoxification, detumescence and blood stasis, clear throat, and unique flavor. At the same time, the low calorie and low sugar content of the beverage also brings more choices for others; the research of honeysuckle and dandelion compound health drinks also opens up new directions and fields for the beverage industry. However, the product has some limitations. Turbidity and precipitation may affect the taste and appearance of the product.

Acknowledgement

This work was supported by Horizontal Project of Bozhou University (No.: BYH202402)

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