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RView on Physical Function of Alkylamide Compounds from Zanthoxylum Bungeanum

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Abstract: Zanthoxylum bungeanum,BelongingRUtaceae family and Zanthoxylum L.Genus,Is one of the traditional "eight major conditions" in China,Which is an important entry in many kinds of tra-Traditional Chinese Medicine due to the functional activates of Cold-diving,Dehumidification,Anaesthesia,And acesodyne.China has the highest planting area and yield of Zanthoxylum bungeanum.As the eco-nomic tree plants,Zanthoxylum bungeanum has the ecological,Social,And economic benefits.RE-cently,The planting area of Zanthoxylum bungeanum has been created at the speed of 20%~30%.It has been widely accepted that zanthohylum bungeanum has distilled medical functions,Such as antioxi-Dant activities,Inside activities,Anaesthesia,Anti-inflammatory and analgesic,Hypolipidemic,Re-moving wrinkles,Anticancer,And so on.As the special functional ingredients,Alkylamide Compounds

Or hemp flavor substance)Posess many biological properties.Howover,The mechanism of these Biolog-iCal properties were not fully understood.Therefore,Zanthoxylum bungeanum has not been fully applied in medicine and daily chemical products.This review surveys updated searches on the main spe-cies of alkylamide ingredients in Zanthoxylum bungeanum and their review functions in order to provide necessary reference for the further systematic study.

Keywords: Zanthoxylum bungeanum;Alkylamide compounds;Physiological Function;Types

Thermophilic Streptococcus was public think is security of strain as an Fermentation[1-4] Agent strain was widely used in Dairy Products Industry .In Fermentation Process In thermophilic Streptococcus can produce extracellular polysaccharide,Vitamin and some volatile

Even though the dairy products can be detected in the many kinds of volatile compounds but some researchers think only minority of volatile compounds of dairy products Is a kind of can and gas chromatography mass spectrometry combined instrument (Gas chromatog-raphy-Mass SpectrumGC-MS)Used of New Volatile Compounds extraction technology has operation methods simple,Sensitivity higher excellent [14] Point widely application in flavor detection of each field.Wei may and Application top empty Solid Phase Micro-Extraction-Gas Chromatography Mass Spectrometry Combined with technology extraction Piteguo pulp of volatile flavor material and optimization the extraction conditions found Piteguo in content is high flavor material have Hexene acid B [15]

Ester,Butyl Acetate,Ethyl Acetate and ethyl caproate and.Smoothed and the solid phase micro-extraction and temperament combined technology12-Dichlorobenzene as an in standard of established the dairy products in benzoic acid of Detection Methods.[16] Xiao zuo soldiers and use top empty Solid Phase Micro-extraction technology of domestic cherry wine the analysis found domestic cherry wine of Main Aroma Components for ethyl acetate,Ethyl caprylate,ETHYL BENZOATE,Benzene ETHANOL ANDDL-Limonene and.

At present, domestic scholars even though the of fermented milk in flavor material the large number research but on different regional separation strain in Fermentation Process in of flavor material research rarely.This experiment using solid phase micro-Extraction-Gas Chromatography Mass Spectrometry Combined Technology of Thermophilic Streptococcus fermented milk in Of flavor material the analysis investigate the from different region thermophilic streptococcus in Fermentation Process in of flavor material of difference at the same time combinedROAVValue compare the analysis fermented milk in key flavor material the fermented milk in flavor material of diversity clear fermented milk of the main features of the aroma.

1. Material and Methods

1.1 Material and reagent

Experiment with6Of Thermophilic Streptococcus by Inner Mongolia Agricultural University dairy Biological Technology and Engineering of Ministry of Education, Key Laboratory provide strain source information such as table1.Experiment with of skim milk powder and whole milk powder by AmericanFonterraThe company production,MRSMedium purchase self-British

1.2 Instrument and Equipment

Gas Chromatography-Mass Spectrometry Combined instrument (Agilent 7890B GC sys-tem-5977A MSD);Column (HP-5Capillary Column,30 m 0. 25mm0. 25MuM);Manual Solid Phase Micro-extraction (SPME)Into-like handle (USASUP-ELCO);Stationary equipment and50/30 μMDiethylbenzene/Carbon molecular sieve/Poly (dimethyl siloxane (Divinyl-benzene/carboxen/polydimethylsiloxane,DVB/CAR/PDMS)Extraction head;Ceramic heating magnetic stirrer (Corning).

1.3 Experimental Method

1.3.1 Preparation of whole milk

Heat in distilled water50, Join11. 5%Whole milk powder, when the water temperature rises60Time join6. 5%Cane Sugar.Fully blended and in60Time hydration30 minAnd then homogenize the whole milk.Homogeneous Pressure is Low Pressure15 MPaAND HIGH PRESSURE35 MPa, Homogenization2.Time.Will homogenize the good whole milk in95Pasteurization under conditions5 min.After pasteurization, the whole milk is suddenly cold and placed in4.Spare.

1.3.2 Preparation of fermented milk

Will be in-4. Preserved in Chinese6.Experimental strains were inoculated In the skim milk medium37Foster24 h, Re-inoculation inMRSIn liquid medium,37Foster24 hStrain activity in three generations

To Max.In50 mlAnd200 mRSIn the liquid medium, the bacteria were collected after centrifugation.PBSBacteria suspension made of protective agent.Will ferment5x10^{7}·Cfu/mlInoculated in the prepared whole milk and separately loaded in the sample bottle.Place the sample 42. Culture in the incubator to reach the fermentation endpoint (PHValue4. 5)When, stop fermenting, in4.Storage.

1.3.3 Determination of Volatile flavor compounds

1.)Chromatographic Condition.Carrying GasHe, Velocity1. 0 mL/min;No matter into the sample, inlet temperature250.Temperature Programmed, starting temperature35, Keep5 minAfter5/minRate of rise 140, Keep2 minAnd then10/minThe rate rises 250, Keep3 min;

2.)Mass Spectrometry Conditions.Full scan mode,EIIon Source, electron energy70 eV, The ion source temperature is230, Quality scan rangeM/z 35~500 u, Solvent-free Delay.

3.)SPMEExtraction Condition.Extraction head aging:Yu250 Jin Sample aging30 min.Solid Phase Microextraction Conditions:Yu50 Magnetic stirring Adsorption on Mixer60 min.Desorption conditions:250 1) conditional Solution Adsorption3 min.

1.3.4 Qualitative and Quantitative Analysis

1.)Qualitative Method.Using Random carryMasshunterWorkstationNIST 11Standard library for automatic comparison, choose the matching rateMore than 85%

As identification results, and on the basisVandendoolDetermination of retention index (Retention Indices,RI)According to the literature reportRIThe volatile flavor compounds in fermented milk samples were re-identified..

2.)Quantitative Method.Using the area normalization method to calculate the peak area percentage (relative content).

1.3.5 Evaluation of key volatile substances

Key volatile flavor compounds in fermented milk.First of all, the component that contributes the most to the flavor of the sample is definedROAV$_{Max}$= 100For other aroma components (1.).

Type (1.)Middle:C_IAndT_IThe relative content of the volatile substances,%And the corresponding sensory threshold,μG/l;C_{Max}AndT_{Max}The relative content of the largest component was contributed to the overall flavor of the sample,%And the corresponding sensory threshold,μG/l.

Generally consideredROAVNot less1.As the key flavor compounds of the tested samples,0. 1 ≤ROAV<1.The composition

1.4 Data Processing

UtilizationExcel,Simca-PData processing and Principal Components

Similarity evaluation system for chromatographic fingerprint of Traditional Chinese MedicineATo calculate and evaluateGCSimilarity of fingerprint.

2. Results and Analysis

2. GC-MSResults Analysis

JingNIST 11Standard Library retrieval the components volatile components use area Normalized Method Calculation

the components relative peak area percentage such 4. For further determine fermentation milk of key flavor material combined with table2Shown in material of relative content and feel threshold determine the componentsROAVSuch as table3. Fermentation milk in detection to the ethanol and isopropyl alcohol of relative content respectively 23.93%And10. 39%Was significantly higher than that of other strains fermented milk in Alcohol Content.These alcohols of compounds of flavor threshold is generally high,[26] The fermented milk of overall flavor contribution is small .G81-3Fermented Milk detection of the Communist Party of China28A volatile flavor material which diacetyl,Acetoin,2-Ren,Ethyl Butyrate,Ethyl Acetate and acetaldehydeROAVValue not less1IsG81-3Fermentation Milk in key Volatile Compounds.Ethyl acetate is by ethanol and Acid[27] Class substances esterification reaction or by chemical esterification reaction With fruit aroma and brandy-like the taste.Acetaldehyde as an yogurt of characteristic flavor material to give yogurt refreshing of aromatic Bulgaria fermentation of results more consistent.In addition to these key flavor compounds heptaldehyde,2-Heptanone and2-Eleven ofROAVValue 0.1~1The fermented milk of overall flavor the important modified role.MGA47-1Fermented Milk detection of the Communist Party of China19A volatile wind Taste material which diacetyl,Acetoin,2-Heptanone,2-Ren,2-Eleven of and2-Methyl propionic acidROAVValue are not less1Is the Key volatile compounds in the fermented milk of this strain..2-Methyl PROPIONIC ACID WITH ACID[25], Flavor and milk flavor, which can give the unique characteristic flavor of fermented milk.In addition,3-Methyl butyric acidROAVValue in0. 1~1.To modify the flavor of fermented milk..

Mgb79-3.Fermented Milk Detected22.Volatile wind

Taste substances, wherein, diacetyl,Acetoin,2-Nonone,2-Methyl propionic acid 2-Methyl butyric acidROAVValue not less1.Key volatile compounds in fermented milk.And others5.Compared with Streptococcus thermophilus fermented milk,Mgb79-3.Diacetyl in fermented milk,The relative content of acetoin was relatively high, reaching11. 92%And14. 15%.Mgb79-3.Fa Fermented Milk Detected8.Acid Compounds in which acetic acid,3-Methyl butyric acid content reached10%Above.Studies have shown that low concentrations of Acid The compounds are light,Pleasant scent but high concentration [31] Will have a negative effect on the overall aroma quality.In addition to these key compounds,2-11 ketone,3-Methyl butyric acidROAVValue i 0.1.~1 And played a role in modifying the overall flavor of fermented milk..

Mgb80-2.Fermented Milk Detected22.Volatile wind Taste substances, wherein, diacetyl,Acetoin,2-Nonone,2-Methyl propionic acid,2-Methyl butyric acidROAVValue not less1.Is a key volatile compound.Acetin is a kind of ketone compounds which has an important influence on the flavor of fermented milk.Alpha-Acetolactic acid is formed under the action of acetolactic decarboxylase, Which is irritating.

The formation of flavor plays a key role.In addition, acetaldehyde,2-11 ketone,3-Methyl butyric acidROAVValue in0. 1~1.And played a role in modifying the overall flavor of fermented milk..

2.2 Fingerprint analysis

Fingerprint is most commonly used in the analysis and detection of traditional Chinese medicine, and it is suitable for the study of complex chemical composition..UtilizationGCOverlapping chromatograms of different fermented milk samples were drawn by fingerprint similarity evaluation system (Figure1.)The angle cosine method was used to evaluate the fermented milk samples from different regions.GCSimilarity Between fingerprints (Table4.).

In this experiment, each group of fermented milk samples was3.Repeat determination, parallel sample was obtainedGCThe similarity between fingerprints is 0.93~0.96The results indicated that the method had a good reproducibility for the determination of fermented milk samples.GCProviding data basis for the differences between fingerprints.

Slave chart1.From the Mongolian and Gansu regions There are obvious differences in chromatographic peaks of Streptococcus thermophilus fermented milk.Slave table3.Discovery,6.The similarity between the fingerprint of the strain and the control0. 471~0.69The results showed that the flavor compounds produced by the strain during fermentation were significantly different..G80-5.WithG81-1.AndG81-3.The similarity between them is0. 306And0. 274,G81-1.WithG81-3.The similarity between them can be reached0. 719;Mga47-1.WithMgb79-3.Mgb80-2.The similarity0. 356And0. 384, Mgb79-3.WithMgb80-2.Similarity can be reached0. 575;The similarity between the fingerprint of fermented milk FROM GANSU AND MONGOLIA0. 047~0. 211The results indicated that there was a high similarity between flavor compounds in Streptococcus thermophilus fermented milk from the same region, while the similarity between flavor compounds in fermented milk of strains from different regions was low..

2.3 Results of principal component analysis

In the sample score chart, the closer the sample point is, the higher the similarity of aroma composition and content is..Figure2.For strain score chart, by figure 2. It can be seen that the strains from Gansu are on the right side of the score chart, and the strains from Mongolia are on the left side of the score chart, the results indicated that the aroma composition and content of the strains from different regions were significantly different in the fermentation process, which was consistent with the results of fingerprint analysis..

The closer the upper one is, the higher the correlation is..Figure3.For the flavor Material Load Diagram, by the figure2.(Strain score chart)Tutu3.(Flavor substance loading chart)You know,G80-5.There was a strong positive correlation between aromatic and alkane compounds, nitrogen-containing and heterocyclic compounds;G81-1.There was a strong positive correlation between alcohol compounds, aromatic and alkane compounds;G81-3.With

Aldehydes,There was a strong positive correlation between esters and aromatic compounds;Mga47-1.AndMgb79-3.There was a strong positive correlation between ketones and acids;

Mgb80-2.There is a strong positive correlation between acids and other compounds..Therefore, the main flavor substances produced by the strains from Gansu were relatively rich, and alcohols were also found in the fermentation process.,Aldehydes

Union,ESTER COMPOUNDS,Aromatic and alkane Compounds,Nitrogen and heterocyclic compounds were positively correlated, while strains from Mongolia were only positively correlated with ketones and acids.

Alcohols (12Species),Aromatic and alkane compounds (10Species),Nitrogen and Heterocyclic Compounds(4.Species),Other Compounds(2.Species). ROAVThe analysis results show that,Acetoin,Acetaldehyde,2-Nonone,2-Heptanone,2-11 ketone,2-Methyl propionic acid,2-Methyl butyric acid,Ethyl Butyrate,Ethyl Acetate,Isopropyl alcohol and Ethyl Benzene12As a key flavor compound, volatile compounds have greatly contributed to the overall flavor of fermented milk..ButROAVValue (1.> ROAV>0. 1)Lower flavor compounds such as Acetaldehyde,Heptanal,2-Heptanone,2-11 ketone,3-Methyl butyric acid, toluene and so on can be used together with other flavor compounds in the evaluation of fermented milk, and affect the overall flavor of fermented milk..The results of principal component analysis and Similarity analysis showed that the flavor compounds in Streptococcus thermophilus fermented milk from the same region had a high similarity, while the flavor compounds in the fermented milk of strains from different regions had a low similarity, it shows that the growth environment pressure can affect the aroma production characteristics of fermented milk by strain..

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