

美国《化学文摘》CA、英国《食品科技文摘》FSTA、日本科学技术振兴机构数据库JST、中国科技核心期刊CSTPCD、北大核心期刊、RCCSE中国核心学术期刊、中国生物医学文献服务系统SinoMed收录期刊、中国农业核心期刊、中国精品科技期刊

# 食品工业科技

Science and Technology of Food Industry

SHIPIN GONGYE KEJI

ISSN 1002—0306  
CN 11-1759/TS



2021 7

第42卷 Vol.42

Q K 2 1 1 3 3 9 4

广告

卡拉胶、琼脂、魔芋胶  
为您提供专属的质构解决方案



ISSN 1002-0306



07>

万方数据



诚聘软糖、果冻应用研发工程师、资深销售。

简历请发送至：[lcr@greenfreshfood.com](mailto:lcr@greenfreshfood.com)

电话：0592-5213819 传真：0592-5213815

邮箱：[sales@greenfreshfood.com](mailto:sales@greenfreshfood.com) <http://www.greenfreshfood.com>

  
**Greenfresh** 绿新集团  
股票代码: 1084HK



# 食品工业科技

SHIPIN GONGYE KEJI

2021年4月 第42卷 第7期

## 目 次

### 研究与探讨

#### 基于主成分和聚类分析的不同品种猕猴桃鲜食品质评价

王丹, 梁锦, 黄天姿, 张璐, 李锐, 李瑞娟, 杨淑霞, 罗安伟\*(1)

基于低场核磁的紫薯片真空冷冻干燥过程中水分变化 孙江丽, 李瑞, 朱洪梅\*(9)

海蜇I型胶原蛋白的提取及结构特性研究 冯玲玲, 冯进, 李春阳\*(15)

湿热处理对山药粉理化及结构性质的影响 贾淑玉, 张百汝, 李杰, 崔波, 于滨\*(22)

不同采收期黄参茎叶化学成分及生物活性变化 鲍诗晗, 何玉英, 王纯, 马文娜, 王雪冰, 孙翔宇, 马婷婷\*(27)

#### 复合发酵剂对发酵牛肉干理化品质及安全性能的影响

梁蕊芳, 张邦建, 高丽霞, 梁国良, 李瑛, 王德宝, 徐龙\*(43)

甘蔗汁中絮凝物产生的影响因素 侯楚璇, 苏德智, 冯秀静, 张昆华\*, 陆海勤, 李凯(50)

花青素对牛血清白蛋白的光谱特性及构象的影响 赵旭红, 夏彩芬\*, 周紫薇, 庄文丽, 郭梅英(57)

雪莲果叶的采收时期、干燥方法及其对饼干品质影响的研究 戴得蓉, 胡昊, 段丽丽, 徐向波, 李杰(63)

复配麦芽糊精及 $\beta$ -环糊精对喷雾干燥甘薯全粉品质的影响 董楠, 王启富, 陈中爱, 吕都, 邓仁菊\*(70)

三种家禽血豆腐凝胶特性和滋味研究 王鑫, 王道营, 徐为民, 邹烨\*, 方维明\*, 田宏伟, 周富裕(76)

#### 不同分子量澳洲坚果多肽氨基酸组成与抑菌活性

马尚玄, 郭刚军\*, 黄克昌, 胡小静, 付镓榕, 徐荣, 李志燕, 邹建云(83)

### 生物工程

桔青霉产核酸酶P1酶分离纯化及其酶学性质 李明, 余华顺, 喻晨, 吴尧, 龚大春\*(89)

致病性小肠结肠炎耶尔森氏菌分离鉴定及三重PCR检测方法的建立 张楠驰, 荀小兰, 王利\*(95)

基因共表达对人源LysoPLD异源可溶性表达、纯化及酶学性质的影响 马文君, 滕琳, 王培培, 卫宏远, 郑春阳(102)

一株高浓度氨氮耐受的除氨氮菌筛选、鉴定及发酵条件优化 谷雅文, 于鲲鹏, 任玉文, 闫珂, 周晓辉\*(110)

面包酵母冻干粉保护剂筛选及其生物活性分析 韩芸娇, 张媛媛\*, 夏雪芬, 董施彬, 张彬\*, 肖霄(119)

重组鲍鱼肌肉脯氨酰内肽酶的性质研究 李婉玉, 李越, 翁凌, 陈守峰, 陈玉磊, 刘光明, 曹敏杰\*(129)

#### 基于微观结构和蛋白质组学分析影响猪肉持水性的差异蛋白

杨波若, 李华健, 苏娅宁, 李霞, 瞿静, 陈韬\*(136)

外源抑制物对风干肠微生物群落组成变化的影响 陈援援, 于德阳, 秦建鹏, 马俪珍\*(145)

### 工艺技术

预处理方式对米糠酵素品质的影响 董欣睿, 赵鑫磊+, 杨嵛茜, 江连州, 于殿宇, 包怡红\*(150)

# 食品工业科技

SHIPIN GONGYE KEJI

2021年4月 第42卷 第7期

## 目 次

- 红毛藻多酚提取工艺优化及抗氧化活性 ..... 李月, 纪乃茹, 李健\*, 王力(156)
- 响应面法优化超声微波联用辅助提取黑木耳黑色素工艺 ..... 宋丹靓敏, 么宏伟, 曾伟民, 冯磊, 王森, 程文, 万鹏, 雷虹\*(162)
- 复合酶解法制备山楂绞股蓝清多肽复合饮料的工艺优化 ..... 蒋莹, 沈荷玉, 周可强, 李诚\*, 姜荣杰, 唐婉婷, 李辰凤(171)
- 荞麦叶黄酮的提取工艺优化及其抗氧化性 ..... 宋越冬, 陈晓庆, 张毓敏, 张艳芳, 王智怡, 王菲(180)
- 碱蓬草总生物碱提取工艺优化及其对高脂饮食小鼠的体内抗氧化活性 ..... 李小阳, 韩冠英\*, 闫松, 赵艳丹, 郭斌, 崔鳌(188)
- 响应面法优化黑胡萝卜红色素双水相萃取工艺 ..... 李治城, 武玉倩, 张婕妤, 展亚莉, 常秀莲\*(195)
- 均质条件对核桃乳稳定性的影响 ..... 齐兵, 赵慧博, 赵慧敏, 徐姗, 李喜层, 吴彦兵, 耿会, 葛冬雪, 夏君霞\*(201)
- 桑树桑黄总三萜提取工艺优化及其降血脂、抗氧化活性研究 ..... 何策, 王超\*, 陈纯, 王婷婷(208)
- 红岛蛤蜊肉酶解工艺优化及其产物降血压功能研究 ..... 曹廷锋, 刘金丽\*, 樊芳, 尹德翠, 邹圣灿(216)
- 纳豆芽孢杆菌发酵菜用大豆中总黄酮的提取及其降血脂效果评价 ..... 李秀凉, 倪庆圆, 杨宸, 宋永, 韩晓云, 孙庆申\*(223)

## 食品安全

- 2017~2019年全国食品安全抽检情况分析 ..... 陶庆会, 杨雪, 宋玉洁, 金俊阳(231)

## 分析检测

- 超高效液相色谱-串联质谱法同时测定玉米中9种真菌毒素 ..... 谭莉, 孟繁磊, 范宏, ANNA Nowacka, 魏春雁\*(240)
- 海藻酸钠裂解酶活测定方法研究 ..... 郑明亮, 郑浑龙, 孟春, 王航\*(246)
- QuEChERS试剂盒-高效液相色谱法检测鸡蛋中阿散酸和洛克沙胂残留 ..... 赵颖, 李典典, 张大卫, 魏月\*, 马晶军\*(252)
- 基于主成分分析和聚类分析综合评价蒸谷米的品质特性 ..... 雷月, 官彦龙\*, 邓茹月, 张大双, 朱速松\*, 唐会会, 陈重远, 张志斌(258)
- 基于UPLC-MS/MS探究烘焙程度对咖啡豆中有机酸含量影响 ..... 王东旭, 王新财, 胡奇杰, 王凤丽, 厉芬, 陈诸建(268)
- GC-MS法比较分析不同产地川佛手精油成分 ..... 王春龙, 罗禹, 段灵鑫, 韩江云, 邹顺梅, 张倩, 罗金凤, 张丹\*(274)
- 电感耦合等离子体质谱( ICP-MS) 测定畜禽肉中9种重金属元素含量 ..... 欧爱芬, 张挺, 梁兰兰, 林俭, 万红霞\*(282)

# 食品工业科技

SHIPIN GONGYE KEJI

2021年4月 第42卷 第7期

## 目 次

QuEChERS-超高效液相色谱-串联质谱法测定蔬菜中9种甲氧基丙烯酸酯类杀菌剂

..... 徐 鹏, 赵建珍, 闫伟伟, 陈佳琛\*, 罗慧玉, 刘 慧(289)

基于静态顶空气相离子迁移谱技术的果啤种类判别 ..... 龚 肖, 周 伟, 李积华\*, 涂京霞\*, 杨涛华, 霍羽佳(296)

### 贮运保鲜

预冷处理结合低温贮藏对西兰花贮藏品质的影响 ..... 谢晓宇, 张 飞, 石 洁, 谢意通, 姜 丽\*(302)

不同储藏条件对小麦流变学特性的影响

..... 曹颖妮, 赵光华, 余大杰, 裴金花, 胡京枝, 魏振亚, 胡卫国, 张军锋, 许 琦, 黄继勇, 郝学飞\*(311)

1-甲基环丙烯和不同贮藏温度对油桃果实硬度与细胞壁果胶的影响

..... 吕真真, 刘 慧, 张春岭, 刘杰超, 杨文博, 焦中高\*(317)

砀山酥梨膜结合态与可溶态多酚氧化酶性质比较 ..... 胡月恒, 刘 芳\*(324)

### 营养与保健

安五脂素对大鼠肠缺血再灌注致肝损伤的保护作用

..... 林慧娇, 张馨芸, 刘嘉玮, 苑丽葳, 刘佳乐, 王春梅, 孙靖辉, 陈建光, 李 贺, 敬 舒\*(330)

四种野生蔬菜营养成分分析 ..... 包艳玲, 高春燕, 卢跃红\*(337)

不同生长阶段翘嘴鮊肌肉营养成分的比较分析 ..... 李绍明, 伍远安, 谢仲桂, 李传武, 程小飞, 李金龙, 何志刚\*(342)

泡桐花多糖的体内外抗氧化活性 ..... 陈晓兰, 圣志存, 陈海峰, 贾纪萍, 李 冉, 维 丹, 陈 未, 冒玉娟(349)

鹿茸乙醇提取物对秀丽隐杆线虫抗衰老的作用 ..... 刘春红, 汤琰聪, 高瑜培, 李云飞, 陈晓光\*(354)

季节变化对杂交鲟鱼肉营养成分的影响 ..... 黄 卉, 魏 涯, 李来好, 杨贤庆, 岑剑伟, 潘 创, 郝淑贤\*(360)

### 专题综述

荧光定量PCR技术在食品快速检测中的应用 ..... 丁博群, 刘珊娜\*(366)

硒多糖的合成方法、结构特征和生物活性研究进展

..... 景永帅, 张钰炜, 李佳瑛, 袁鑫茹, 郑玉光, 吴兰芳\*, 张丹参\*(374)

亚基水平上大豆蛋白凝胶性的研究进展 ..... 付洪玲, 范宏亮, 吕 博, 孙 贺, 单单单, 于寒松\*(382)

代谢工程改造微生物合成单萜芳香产品的研究进展 ..... 朱 坤, 孔 婧, 荣兰新, 刘士琦, 肖冬光, 于爱群\*(390)

超声辅助低共熔溶剂萃取法在活性成分提取与食品分析预处理中应用的研究进展

..... 刘金铭, 王 辉, 张 欢, 陈 倩, 孔保华\*(399)

黑米的营养功能及综合利用研究进展 ..... 熊艳珍, 黄紫萱, 马慧琴, 程建峰\*(408)

食用煎炸油理化指标统计分析方法研究进展 ..... 李裕梅, 唐润发, 杜芳芳, 曹雁平\*, 王 鑫(416)

**SCIENCE AND TECHNOLOGY OF FOOD INDUSTRY**  
**SHIPIN GONGYE KEJI**  
**Apr. 2021 Vol.42 NO.7**

**CONTENTS**

**Research and Investigation**

Fresh Food Quality Evaluation of Kiwifruit Based on Principal Component Analysis and Cluster Analysis	WANG Dan, LIANG Jin, HUANG Tianzi, ZHANG Lu, LI Rui, LI Ruijuan, YANG Shuxia, LUO Anwei*(1)
Water Changes of Purple Sweet Potato Slices Using Low-field NMR during Vacuum Freeze Drying	SUN Jiangli, LI Rui, ZHU Hongmei*(9)
Extraction and Structural Characteristics of Type I Collagen from <i>Rhopilema esculenta</i>	FENG Lingling, FENG Jin, LI Chunyang*(15)
Effect of Heat Moisture Treatment on Physicochemical and Structural Properties of Yam Flour	JIA Shuyu, ZHANG Bairu, LI Jie, CUI Bo, YU Bin*(22)
Variation in the Chemical Composition and Biological Activities of <i>Sphallerocarpus gracilis</i> Stems and Leaves among Different Harvesting Time	BAO Shihan, HE Yuying, WANG Chun, MA Wenna, WANG Xuebing, SUN Xiangyu, MA Tingting*(27)
Effects of Starter Cultures Combination on Physicochemical Quality and Safety of Fermented Beef Jerky	LIANG Ruifang, ZHANG Bangjian, GAO Lixia, LIANG Guoliang, LI Ying, WANG Debao, XU Long*(43)
Study on the Influencing Factors of Floc in Sugarcane Juice	HOU Chuxuan, SU Dezhi, FENG Xiujing, ZHANG Kunhua*, LU Haiqin, LI Kai(50)
Effects of Anthocyanins on Spectral Properties and Conformation of Bovine Serum Album	ZHAO Xuhong, XIA Caifen*, ZHOU Ziwei, ZHUANG Wenli, GUO Meiyi(57)
Study on the Harvest Time, Drying Method of <i>Saussurea sonchifolius</i> Leaves and Their Effects on Biscuit Quality	JI Derong, HU Hao, DUAN Lili, XU Xiangbo, LI Jie(63)
Effect of Formulation Composed of Maltodextrin and $\beta$ -Cyclodextrin on the Quality of Spray-dried Sweet Potato Flour	DONG Nan, WANG Qifu, CHEN Zhongai, LV Du, DENG Renju*(70)
Study on the Gel Properties and Taste of Three Kinds of Poultry Blood Tofu	WANG Xin, WANG Daoying, XU Weimin, ZOU Ye*, FANG Weiming*, TIAN Hongwei, ZHOU Fuyu(76)
Amino Acid Compositions and Antibacterial Activities of Different Molecular Weight Macadamia Nut Polypeptides	MA Shangxuan, GUO Gangjun*, HUANG Kechang, HU Xiaojing, FU Jiarong, XU Rong, LI Zhiyan, ZOU Jianyun(83)

**Bioengineering**

Isolation, Purification and Enzymatic Properties of Nuclease P1 Fermented by <i>Penicillium citrinum</i>	LI Ming, YU Huashun, YU Chen, WU Yao, GONG Dachun*(89)
Isolation and Identification of Pathogenic <i>Yersinia enterocolitica</i> and Development of a Triple PCR Detection Method	ZHANG Nanchi, GOU Xiaolan, WANG Li*(95)
Effect of Gene Co-expression on Heterologous Soluble Expression, Purification and Enzymatic Properties of Human LysoPLD	MA Wenjun, TENG Lin, WANG Peipei, WEI Hongyuan, ZHENG Chunyang(102)
Isolation and Identification of an Ammonia Nitrogen Removal Bacteria Strain with High Tolerance to Ammonia Nitrogen and Optimization of Its Removal Condition	GU Yawen, YU Kunpeng, REN Yuwen, YAN Ke, ZHOU Xiaohui*(110)
Screening of Protective Agent and Bioactivity Analysis of Bread Yeast Freeze-dried Powder	HAN Yunjiao, ZHANG Yuanyuan*, XIA Xuefen, DONG Shibin, ZHANG Bin*, XIAO Xiao(119)
Study on the Properties of Recombinant Prolyl Endopeptidase from Abalone ( <i>Haliotis discus hannai</i> ) Muscle	LI Wanyu, LI Yue, WENG Ling, CHEN Shouseng, CHEN Yulei, LIU Guangming, CAO Minjie*(129)
Analysis of Different Proteins Affecting Water Holding Capacity of Pork Based on Microstructure and Proteomics	YANG Boruo, LI Huajian, SU Yaning, LI Xia, QU Jing, CHEN Tao*(136)
Effects of Exogenous Inhibitors on the Microbial Community Composition Changes of Air-Dried Sausage	CHEN Yuanyuan, YU Deyang, QIN Jianpeng, MA Lizhen*(145)

**SCIENCE AND TECHNOLOGY OF FOOD INDUSTRY**  
**SHIPIN GONGYE KEJI**  
**Apr. 2021 Vol. 42 NO.7**

**CONTENTS**

**Processing Technology**

Effects of Pretreatment Methods on the Quality of Rice Bran Ferment	DONG Xinrui, ZHAO Xinlei*, YANG Yuxi, JIANG Lianzhou, YU Dianyu, BAO Yihong*(150)
Extraction Process Optimization and Antioxidant Activity of Polyphenols from <i>Bangia fusco-purpurea</i>	LI Yue, JI Nairu, LI Jian*, WANG Li(156)
Optimization of Ultrasound-Microwave Assisted Extraction of Melanin from <i>Auricularia auricula-judae</i> by Response Surface Methodology	SONG Danliangmin, YAO Hongwei, ZENG Weimin, FENG Lei, WANG Miao, CHENG Wen, WAN Peng, LEI Hong*(162)
Optimization of the Technology for Preparing Hawthorn <i>Gynostemma pentaphyllum</i> Whey Polypeptide Compound Beverage by Compound Enzymes	JIANG Ying, SHEN Heyu, ZHOU Keqiang, LI Cheng*, JIANG Rongjie, TANG Wanting, LI Chenfeng(171)
Optimization of Extraction Process of Flavonoids from <i>Fagopyrum esculentum</i> Moench Leaves and Its Antioxidant Properties	SONG Yuedong, CHEN Xiaoqing, ZHANG Yumin, ZHANG Yanfang, WANG Zhiyi, WANG Fei(180)
Extraction of Total Alkaloids from <i>Suaeda salsa</i> and Its Antioxidant Activity in Mice Fed with High-fat Diet	LI Xiaoyang, HAN Guanying*, YAN Song, ZHAO Yandan, GUO Bin, CUI Zan(188)
Optimization of Extraction Technology of Anthocyanidins from <i>Daucus carota</i> L. by Aqueous Two-phase System Based on Response Surface Methodology	LI Zhicheng, WU Yuqian, ZHANG Jieyu, ZHAN Yali, CHANG Xiulan*(195)
Effect of Homogenization Conditions on Stability of Walnut Milk	QI Bing, ZHAO Huibo, ZHAO Huimin, XU Shan, LI Xiceng, WU Yanbing, GENG Hui, GE Dongxue, XIA Junxia*(201)
Optimization of Extraction Technology of Total Triterpenoids from <i>Inonotus sanghuang</i> and Their Hypolipidemic and Antioxidant Activities	HE Ce, WANG Chao*, CHEN Chun, WANG Tingting(208)
Optimization of Enzymatic Hydrolysis of Hongdao Clam and Anti-hypertensive Activity of the Resulted Products	CAO Tingfeng, LIU Jinli*, FAN Fang, YIN Decui, ZOU Shengcan(216)
Extraction of Total Flavonoids in Vegetable Soybean Fermented by <i>Bacillus natto</i> and Evaluation of Its Effect on Hypolipidemic Effect	LI Xiuliang, NI Qingyuan, YANG Chen, SONG Yong, HAN Xiaoyun, SUN Qingshen*(223)

**Food Safety**

Analysis of Food Safety Sampling Data in China from 2017 to 2019	TAO Qinghui, YANG Xue, SONG Yujie, JIN Junyang(231)
--	---

**Analysis and Determination**

Determination of 9 Kinds of Mycotoxins in Maize by Ultra Performance Liquid Chromatography-tandem Mass Spectrometry	TAN Li, MENG Fanlei, FAN Hong, ANNA Nowacka, WEI Chunyan*(240)
Study on the Test of Sodium Alginate Lyase Activity	ZHENG Mingliang, ZHENG Hunlong, MENG Chun, WANG Hang*(246)
Determination of Arsanilic acid and Roxarsone Residues in Eggs by QuEChERS kit -High Performance Liquid Chromatography	ZHAO Ying, LI Diandian, ZHANG Dawei, WEI Yue*, MA Jingjun*(252)
Comprehensive Evaluation of Quality Characteristics of Parboiled Rice Based on Principal Component Analysis and Cluster Analysis	LEI Yue, GONG Yanlong*, DENG Ruyue, ZHANG Dashuang, ZHU Susong*, TANG Huihui, CHEN Zhongyuan, ZHANG Zhibin(258)
Exploring the Effect of Roasting Degree on the Content of Organic Acids in Coffee Beans Based on UPLC-MS/MS	WANG Dongxu, WANG Xincai, HU Qijie, WANG Fengli, LI Fen, CHEN Chujian(268)
Comparative Analysis of Essential Oil Components of Bergamot from Different Origins by GC-MS	WANG Chunlong, LUO Yu, DUAN Lingxin, HAN Jiangyun, ZOU Shunmei, ZHANG Qian, LUO Jinfeng, ZHANG Dan*(274)
Determination of Nine Heavy Metal Elements in Livestock and Poultry Meat by ICP-MS	OU Aifen, ZHANG Ting, LIANG Lanlan, LIN Jian, WAN Hongxia*(282)
Determination of 9 Strobilurin Fungicides in Vegetables by QuECHERS-Ultra-High Performance Liquid Chromatography-Tandem Mass Spectrometry	XU Peng, ZHAO Jianzhen, YAN Weiwei, CHEN Jiachen*, LUO Huiyu, LIU Hui(289)

# SCIENCE AND TECHNOLOGY OF FOOD INDUSTRY

## SHIPIN GONGYE KEJI

Apr. 2021 Vol. 42 NO.7

### CONTENTS

Identification of Fruit Beers Based on Static Headspace-Gas Chromatography-Ion Mobility Spectroscopy (SH-GC-IMS)

..... GONG Xiao, ZHOU Wei, LI Jihua\*, TU Jingxia\*, YANG Taohua, HUO Yujia(296)

## Storage and Preservation

Effect of Pre-cooling Treatment and Low Temperature Storage on Storage Quality of Broccoli

..... XIE Xiaoyu, ZHNAG Fei, SHI Jie, XIE Yitong, JIANG Li\*(302)

Effects of Different Storage Conditions on Dough Rheological Properties of Wheat Varieties

..... CAO Yingni, ZHAO Guanghua, YU Dajie, PEI Jinhua, HU Jingzhi, WEI Zhenya, HU Weiguo, ZHANG Junfeng, XU Qi, HUANG Jiyong, HAO Xuefei\*(311)

Effects of 1-Methylcyclopropene and Different Ambient Temperature on Firmness and Cell Wall Pectin in Postharvest Nectarine

..... LV Zhenzhen, LIU Hui, ZHANG Chunling, LIU Jiechao, YANG Wenbo, JIAO Zhonggao\*(317)

Comparison of Properties of Membrane-Bound and Soluble Polyphenol Oxidase from Dangshan Pear

..... HU Yueheng, LIU Fang\*(324)

## Nutrition and Healthcare

Effects of Anwuligan on the Hepatic Injury Induced by Intestinal Ischemia-Reperfusion in Rats

..... LIN Huijiao, ZHANG Xinyun, LIU Jiawei, YUAN Liwei, LIU Jiale, WANG Chunmei, SUN Jinghui, CHEN Jianguang, LI He, JING Shu\*(330)

Analysis of Nutritional Components in Four Wild Vegetables

..... BAO Yanling, GAO Chunyan, LU Yuehong\*(337)

Comparative Analysis on Muscle Nutrient Composition of *Culter alburnus* at Different Growth Stages

..... LI Shaoming, WU Yuan'an, XIE Zhonggui, LI Chuangwu, CHENG Xiaofei, LI Jinlong, HE Zhigang\*(342)

Antioxidant Activity *in Vitro* and *Vivo* of Polysaccharide from *Paulownia fortunei* Flower

..... CHEN Xiaolan, SHENG Zhicun, CHEN Haifeng, JIA Jiping, LI Ran, LUO Dan, CHEN Wei, MAO Yujuan(349)

Anti-aging Effect of Ethanol Extract of Velvet Antler on *Caenorhabditis elegans*

..... LIU Chunhong, TANG Yicong, GAO Yupei, LI Yunfei, CHEN Xiaoguang\*(354)

Effects of Seasonal Variation on Nutrient Composition of Hybrid Sturgeon (*Huso dauricus* ♀ × *Acipenser schrenckii* ♂)

..... HUANG Hui, WEI Ya, LI Laihao, YANG Xianqing, CEN Jianwei, PAN Chuang, HAO Shuxian\*(360)

## Reviews

Application of Real-time Quantitative PCR Technology in Food Rapid Detection

..... DING Boqun, LIU Shanna\*(366)

Research Progress of Synthesis Methods, Structural Characteristics and Biological Activities of Selenium Polysaccharides

..... JING Yongshuai, ZHANG Yuwei, LI Jiaying, YUAN Xinru, ZHENG Yuguang, WU Lanfang\*, ZHANG Danshen\*(374)

Research Progress of Soybean Protein Gels at Subunit Level

..... FU Hongling, FAN Hongliang, LV Bo, SUN He, SHAN Dandan, YU Hansong\*(382)

Research Progress in Microbial Metabolic Engineering for Producing Monoterpene Aroma Products

..... ZHU Kun, KONG Jing, RONG Lanxin, LIU Shiqi, XIAO Dongguang, YU Aiqun\*(390)

Research Progress on Extraction of Active Ingredients and Pretreatment of Food Analysis by Ultrasound-Assisted Deep Eutectic Solvent Method

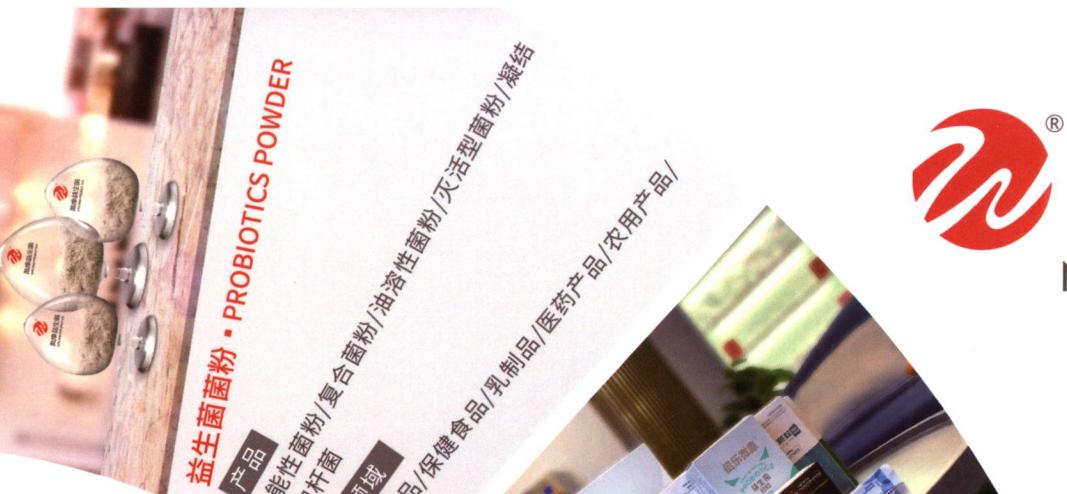
..... LIU Jinming, WANG Hui, ZHANG Huan, CHEN Qian, KONG Baohua\*(399)

Advances on Nutritional Functions and Comprehensive Utilization of Black (Pericarp) Rice (*Oryza sativa* L.)

..... XIONG Yanzhen, HUANG Zixuan, MA Huiqin, CHENG Jianfeng\*(408)

Research Progress of Statistical Analysis Methods for Physicochemical Parameters of Edible Frying Oil

..... LI Yumei, TANG Runfa, DU Fangfang, CAO Yanping\*, WANG Xin(416)



微康益生菌

WECARE-PROBIOTICS

National probiotics  
Chinese dream

民族菌  
中国梦



# 民族益生菌 产业领导者

WECARE—PROBIOTICS EXPERT

益生菌产品完整解决方案

产品出口世界80多个国家和地区

益生菌制剂 · PROBIOTIC DOSAGE FORM

产品

粉剂/颗粒剂/片剂/胶囊

应用领域

功能性食品/保健食品/医药产品等



发酵食品菌种 · FOOD STARTER CULTURES

产品

发酵乳菌种/乳酸菌饮料菌种/生物保鲜菌/家用餐  
用酸奶发酵剂/酸奶发酵粉/泡菜发酵剂

应用领域

发酵乳/奶酪/乳酸菌饮料/发酵果蔬/家用餐用酸奶等



产品  
浓缩乳酸菌饮料(原味、开  
菲尔、酸奶风味)/康普茶  
饮料/功能性发酵饮料  
(果蔬汁/酵素等)  
应用领域  
餐饮(奶茶、餐饮/烘焙/水  
吧等)商超/零售/电商等



业务合作热线  
400-8518-553

微康益生菌(苏州)股份有限公司  
江苏省苏州市吴江经济技术开发区  
龙桥路1033号