

Index

a

- abiotic elicitors 51–52
- abscisic acid (ABA) 29, 38
- acetaldehyde 103–104, 178
- acetate esters 30, 99, 100
- acid sensing ion channels (ASIC) 212
- acyl-CoA 100
- agricultural diversification 4
- agrobiodiversity conservation
 - medicinal plants 6
 - metabolomic-based phylogeny 6
 - molecular-based phylogenetics 6–7
- agro waste production 153
- air suspension coating 69
- ajwain 134
- alcohol fermentation 92–94, 98–101, 103, 104, 109
- aldehyde metabolism 104
- alkalooids 7, 10, 32, 33, 35, 37, 173
- Allium cepa* 139
- Allium sativum* 138
- allyl hexanoate 157
- alpha-linolenic acid (ALA) 57, 81
- aminoacid metabolism 37–38
- amino acids 4, 27, 30–32, 35, 37–39, 48, 78, 79, 94, 101–103, 107, 173, 174, 208, 213, 231
- Analysis of Variance (ANOVA) 186
- Apium graveolens* 135
- Appellation of Origin Mezcal (AOM) 105
- appropriate daily intakes (ADIs) 150
- aroma compounds 4, 25, 26, 37, 51, 52, 54, 55, 65, 80, 81, 98, 139, 165, 171, 179, 199
- aroma extract dilution analysis (AEDA) 179
- aroma materials 117
- aromatic materials 118, 119
- aromatic plants 4, 7, 76, 117
- aromatic resins 117

artificial neural networks (ANN) 215

- asafoetida 118
 - seasoning ingredient 134–135
- ATF1 100, 101

b

- Baking method 80
- basil 140, 154, 198
- benzoin resinoids 124, 125
- benzoin Sumatra 124
- beverages 3, 30–32, 54, 66, 69–71, 125, 152, 157, 170, 198, 199, 207, 226–228, 231, 233
 - and confectionaries 73–85
 - flavor biochemistry of fermented alcoholic 91–109
- bioactive peptides 209–210
- biochemical Ehrlich pathway 102
- biopeptide biosynthesis 210
- biotic elicitors 51
- black pepper 30, 135, 174
- bottlenecks 192–193
- Brettanomyces* 93

c

- Canarium luzonicum* 120, 122
- Capsicum annuum* 135–136
- carbohydrate metabolism 38–39
- cardamom 6, 7, 16, 138
- carotenoid metabolism 38
- celery seed 135
- central carbon metabolism 35
- centrifugal extrusion method 69
- Ceratocystis fimbriata* 153
- cetyl trimethylammonium bromide (CTAB)
 - methods 7
- chemosystematics 6–7

- chili pepper 12, 135, 174
 cinnamaldehyde 7, 136, 154,
 156, 157
 cinnamic aldehyde 7
Cinnamomum cassia 136
 cinnamon 7, 16, 78, 136, 154, 157
Cistus ladaniferus 117, 125, 126
 Clary Sage 77
 cloves 136
 coacervation 67, 68
 cocoa seeds 9
Commiphora myrrha 126–127
 comparative genomics 208–209
 compound annual growth rate (CAGR) 75
 confectionary 7, 71, 73, 75, 233
 consumer perception 229–230
 food psychology 231–232
 food selection 230–231
 cooling technique 69
 coriander 136–137
Coriandrum sativum 136–137
 cranial nerve fibers 95
 cranial nerves 96, 195, 197
 cryptic diversity 6
 cumin 137
Cuminum cyminum 137
Curcuma domestica 140
 β -cyclodextrin molecule 68
- d**
 database depository 210
 davana oil 7, 14, 16
 defects of foods 169–170
 desorption electrospray ionization mass spectrometry imaging (DESI-MSI) 12
 diacetyl 81
 diacetyl (2,3-butanedione) 155
 1,2-dicarbonyl compounds 81–82
 docking, virtual screening tools
 216–217
- e**
 Ehrlich pathway 52, 102
 electronic noses 97, 179
 electronic tongues 97, 179
 Elemis 120
Elettaria cardamomum 6, 7
 elicitation, secondary metabolites 50
Ellettaria cardamomum 138
 Embden-Meyerhof pathway 98
 encapsulation techniques
 coacervation 68
 extrusion process 69
 fluidized bed coating 69
 molecular inclusion method 68
 spray chilling 69
 spray drying 68–69
 enzymes, synthesis 151–152
 epithelial sodium channel (ENaC)
 197, 212
 ethyl acetate 27, 51, 93, 99, 100, 107
 ethyl decadienoate 157
 4-ethylguaiacol (4-EG) 93
 ethyl maltol 81, 82, 158
 4-ethylphenol (4-EP) 93
 ethyl propionate 157
 extracted oleoresins 118
- f**
 fatty acid esters 99–101
 fatty acid metabolism 38, 48
 fennel 119, 137
 fenugreek 7, 10, 16, 137
 fermentation, food flavors
 152–153
 fermentation products 30
 fermentation type 31
 fermented alcoholic beverages
 alcoholic fermentation 92–94
 flavor aspects 94–97
 flavor biochemistry
 Mezcal 105–108
 wines 98–105
Ferula asa-foetida 134–135
Ferula assa-foetida 118, 119
Ferula gummosa 119–120
 flavor 65
 classification of 26
 defined 25
 permissible limits of 155, 156
 for product quality 47
 flavor-active esters 80–81
 Flavor and Extract Manufacturers Association (FEMA) 66, 74, 154, 155, 158
 flavor and fragrance 16, 33, 34, 53, 75, 128,
 149–158, 207, 218
 flavor and fragrance industry
 phenolic compounds 34
 terpenoids 33–34
 flavorant 65
 flavor bioinformatics
 bioactive peptides 209–210
 comparative genomics 208–209
 omics technologies 209
 flavor compounds 207
 classification based 76
 flavor generation 76–77
 type of 75
 computational strategy
 homology modelling 211–212
 molecular docking 213–214
 structural motifs 217–218

- synthetic ligands for taste
 receptors 212–213
 virtual screening tools 214–217
- confectionaries and beverages 79
- plant parts 77–78
 quality and safety of 218
- flavor delivery systems 66
 microencapsulation 66–67
 nano encapsulation 67
 role of 66
- flavor enhancement 80
 1,2-dicarbonyl compounds 81–82
 flavor-active esters 80–81
 flaxseed 81
 xylooligosaccharides 81
- flavor enhancers 74, 81, 82, 133, 157, 174, 225, 226, 228, 231
- flavor extraction techniques 150
- flavoring agents 7, 11, 27, 35, 74, 78, 82, 83, 153, 154, 157, 225
- flavor-matrix interaction 199–200
- flavor of foods 65, 81, 177, 178, 197
- flavor perception 228
 flavor receptors 228
 food oral processing 228–229
- flavor retention 198–199
 binding and entrapment 199
 flavor-matrix interaction 199–200
- flavor signature 78
 baking effect 80
 flavor compounds 74
 confectionaries and beverages 79
 flavor generation 76–77
 plant parts 77–78
 in sensory attributes 82–84
 tastes and methods 84
 type of 75–76
- flavor enhancement 80–82
 Maillard reaction effect 79
- flax seed 81, 210
- fluidized bed coating 67, 69, 70
- Foeniculum vulgare* 137
- Food and Drug Administration (FDA) 15, 74, 82, 150, 154, 155, 157, 158
- food choice 82, 200, 227, 229–232
- food flavors 79
 biosynthesis
 from agro waste production 153
 enzymes 151–152
 fermentation 152–153
 plant cells 153–154
- FDA safety evaluation 154–158
- food industry
 fermentation 31
 flavor substances 74
- food intake 226, 229, 232
- food oral processing 226, 228–229
- food psychology 231–232
- food quality 165, 168, 175, 187, 207
- foods and beverages 31, 32, 80, 97, 207, 226, 231, 836
- food selection 230–231
- fragrances 125, 127, 153, 154, 156, 157, 192
 davana oil 14
 lavender 15
 olibanum carteri/serrata 14–15
 terpenoids 33
 vetiver 15
- frankincense 14, 117, 126
- Free Choice Profiling (FCP) 185
- free fatty acid 38, 53
- fusel alcohol synthesis 102
- g**
- galbanum 117, 119–120
 garlic 32, 77, 134, 138, 178
- Gas Chromatography coupled with Mass Spectrometry (GC-MS) 97, 179
- GC-olfactometry (GC-O) 179
- genebanks 6
- gene knockouts 55
- Generally Recognized as Safe (GRAS) 66, 74, 82, 149–151, 154, 155
- genetically modified organisms (GMOs) 52, 58, 233
- ginger 138, 140
- global flavor industry, annual growth rate 70
- glucosinolates 33, 51
- G protein-coupled receptors (GPCRs) 195, 197, 212, 213, 218
- grape compounds 99
- green cardamom 138
- guanylate cyclase-activating protein (GCAP) 194
- gustatory sensations 95
- h**
- Herbes de Provence 77, 137
- herbs 140
 basil 140
 oregano 140–141
 parsley 141
 rosemary 141
 thyme 141–142
- homology modelling 211
- human tongue 95, 228
- hydrolases 152
- i**
- Illicium verum* 139
- imidophosphoimide (IDPi) 15
- isoamyl acetate 27, 51, 99, 100, 151, 156
- isopentyl acetate 156

j

Jasmonic acid (JA) 29
just noticeable difference (JND) 168, 173, 180, 181

k

α -keto-acids 101, 102
Kluyveromyces marxianus 107, 108

l

labdanum 117, 125, 126
lavandula 15
Lavandula angustifolia 15
lavender 7, 14–16, 77, 78
lavor enhancement 80, 82, 178, 226
leave one out cross validation (LOO CV) 216
leave one out (LOO) technique 216
lighting transmitting plasma (LEP) 12
linoleic acid 52, 53
lipase 38, 151–152
Liquidambar orientalis 122–124
L-phenylalanine 52

m

mace 139
maguey 105–108
Maillard reaction 31, 39, 79
maltol 81, 82, 158
marigold 7, 10
maximized survey-derived daily intake (MSDI) 150
mechanistic models 215
medicinal plants 6, 10
Meissner's corpuscles 196
Merkel cells 196
messenger RNA (mRNA) 54
metabolic engineering
tailored enzymes 54–55
transcription factors 54
metabolic pathways
flavor 50
genetically modified organisms 58
metabolic engineering 53
gene knockouts 55, 57
tailored enzymes 54–55
transcription factors 54
plants elicitation
abiotic elicitors 51–52
biotic elicitors 51
plant tissue culture 57
transformation within cells 52, 53
Mezcal 92, 105–109
microencapsulation 66–67, 71
microorganisms, food flavor synthesis 151
molecular-based phylogenetics 6
molecular docking 213–215, 217

molecular inclusion method 68

monosodium glutamate (MSG) 30, 174,

228, 231

mouthfeel 80, 91, 95–97, 166, 173, 175, 176, 199

multiple linear regression (MLR) 215

multiple nonlinear regression (MNLR) 215

multiple-sequence alignment (MSA) 212

Myristica fragrans 11, 139

myrrh 117, 126–128

n

nanoencapsulation method, flavor 67
natural flavors 16, 52, 53, 57, 74–76, 78, 133, 150, 225, 226

natural product diversity

agricultural diversification 4

agrobiodiversity conservation

medicinal plants 6

metabolomic-based phylogeny 6–7

molecular-based phylogenetics 6

economically important plants 7

flavours

cardamom 7

cinnamon 7

cocoa seeds 9–10

fenugreek 10

marigold 10

nutmeg 10–11

paprika 12–13

rosemary 13–14

vanilla 11–12

fragrances

davana oil 14

lavender 15

olibanum carteri/serrata 14–15

vetiver 15

genetic resources and plant breeding 4

next-generation sequencing (NGS)-based

methods 209

non-hydroxylated fatty acids 53

nutmeg 7, 10–11, 16, 139

o

oak compounds 104

odor activity value (OAV) 179

odor of a food 170

odors 15, 30, 34, 75, 77, 82, 95, 97, 107, 120,

123, 126, 127, 139, 153, 156–158,

165–167, 170–172, 177–179, 183, 184,

187, 195, 196, 207

oleic acid 52, 53

olibanum carteri/serrata 7, 14–16

omega-3 fatty acid 57, 81

omics technologies 209, 218

onion 77, 118, 139, 170, 171

- oregano 140–141
 organic acids 27–31, 34, 35, 39, 49, 54,
 102, 107
 organic acids metabolism 39
Origanum vulgare 140–141
Osmium basilicum 140
- p**
 paprika 7, 12–13, 16, 135, 227
 parsley 141
 perfumery 15, 54, 117, 120, 122–123, 125,
 126, 218
Petroselinum sativum 141
 phenolics 9, 15, 33–35, 38, 78, 140, 141, 174
 2-phenylethanol (2-PE) 52, 53, 101
 phenylpropanoid (PP) pathway 33, 35,
 38, 51, 52
 Phosphodiesterase enzymes 194
 physical methods 76, 117
 phytohormones 29, 38, 51
Piper nigrum 135
 plant breeding 4
 plant cells production 153–154
 plant derived flavor compounds 25
 primary metabolites
 flavor compounds 27–31
 flavor formation 35
 secondary metabolites, flavor
 compounds 31–32
 plant genetic resources (PGRs) 6
 plant resins 117
 plants elicitation
 abiotic elicitors 51–52
 biotic elicitors 51
 primary metabolites 27–31
 biosynthesis 36
 principal component analysis (PCA) 30, 186
 proteases 152
 Protein Data Bank (PDB) 212, 217
 Pure Food and Drug Act of 1906, 66
 purine metabolism 37
 pyrones 153
 pyruvate decarboxylase (Pdcp) 103
- q**
 Quantitative Descriptive Analysis (QDA) 185
 quantitative structure-activity relationship
 (QSAR) 215, 216
- r**
 red paprika (RP) 12
 resinoids 14, 75, 117–128
 chemistry of 128
 RNA interference (RNAi) 57
 rosemary oil (RO) 13–14
Rosmarinus officinalis 13, 141
 Ruffini corpuscles 196
- s**
Saccharomyces cerevisiae 30, 48, 92, 152
 savory tastes 30, 212, 228
 seasoning
 blends 142
 types of 143–145
 seasoning ingredient
 herb
 basil 140
 oregano 140–141
 parsley 141
 rosemary 141
 thyme 141–142
 spices
 ajwain 134
 asafoetida 134–135
 black pepper 135
 celery seed 135
 chili pepper 135–136
 cinnamon 136
 clove 136
 coriander 136–137
 cumin 137
 fennel 137
 fenugreek 137
 garlic 138
 ginger 138
 green cardamom 138
 nutmeg and mace 139
 onion 139
 star anise 139
 turmeric 140
 secondary metabolites 31
 classification of 32
 flavor compounds
 with nitrogen 32–33
 without nitrogen 33–34
 secretome 152
 sense of hear 198
 sense of touch 176, 196–197
 sensobolome 49, 233
 sensorial quality, food 166
 sensorium organs
 sense of hear 198
 sense of touch 196
 sensory of sight 193–194
 sensory of taste 197
 sensory control of foods
 assessors/patternists-training 183–184
 samples 184
 sensory laboratory 182–183
 tests and methods 184–186
 sensory evaluation 4, 166, 168, 180–183, 187,
 191, 192, 198, 227

- sensory methods 182, 184, 192, 227
 sensory of sight 193
 sensory of taste 197
 sensory perception 97, 180, 225–234
 sensory science
 bottlenecks and novel insights 192–193
 discriminatory test 192
 flavor retention and release 198
 binding and entrapment 199
 flavor-matrix interaction 199–200
 sensorial characteristics 166–168
 appearance 168
 attributes/properties 167
 color 168–169
 defects 169–170
 flavor 177–179
 odor 170–171
 shape-size 169
 standards for 183
 taste 171–175
 texture 175–177
 sensorium organs 193
 sense of hear 198
 sense of touch 196–197
 sensory of olfaction 194–196
 sensory of sight 193–194
 sensory of taste 197–198
 sensory analyses results 186
 sensory control of foods 182
 assessors/panelists-training 183–184
 samples 184–186
 sensory laboratory 182–183
 tests and methods 184
 sensory evaluation tests 182–183
 somatosensory 196, 197
 spices
 ajwain 134
 asafoetida 134–135
 black pepper 135
 celery seed 135
 chili pepper 135–136
 cinnamon 136
 clove 136
 coriander 136–137
 cumin 137
 fennel 137
 fenugreek 137
 garlic 138
 ginger 138
 green cardamom 138
 nutmeg and mace 139
 onion 139
 star anise 139
 turmeric 140
 spray chilling 67, 69
 spray drying 67–69
 star anise 139
 stem cell growth factor receptor (SCFR) 195
 styrax 122–124
Syzygium aromaticum 136
- t**
 tactile 11, 73, 95, 166, 167, 175–177, 196
Tagetes 10
 tailored enzymes 54–55
 taste enhancer 225, 228
 taste receptors 25, 65, 172, 212–213, 218, 226, 228
 taste types 207
 terpenoids 33–34, 38, 39, 117, 135, 136, 154
 texture of food 134, 175
 thyme 13, 141–142
Thymus vulgaris 141–142
 toxicological concern (TTC) 150
Trachyspermum ammi 134
 transcription factor (TF) 54
 transgenic organisms 58
 tricarboxylic acid (TCA) cycle 27, 35, 39
Trigonella foenum graecum 10, 137
 turmeric 140
- u**
 umami taste 30, 35, 96, 142, 197, 212, 213, 231
 US food supply 150, 154
- v**
 vagus nerve 96, 197
Vanilla planifolia 11
 Vanilla planifolia vanillin synthase (VpVAN) 12
Vetiveria zizanioides 15
 virtual screening tools 214
 docking setups 216–217
 model validation 215–216
 quantitative structure-activity relationship 215
 visual perception 168
 vitamins 29, 137
Vitis vinifera 100
- w**
 wines 98
 carbonyl compounds 103–105
 esters 99–103
 flavor precursors 99
 higher alcohols 101–103
 Mezcal 105–108
 oak compounds 104–105
 wine sensory feature 99
- x**
 xylooligosaccharides (XOS) 81
- z**
Zingiber officinale 138