

Supplementary information

Table 1. Summary of the probiotic-fermented MFHs.

Scientific name	Crucial Ingredient	Biofunction	Probiotics	Reference
<i>Crataegus pinnatifida</i> Bge.	prunetin glycitein	anti-inflammatory bioactivity	<i>L. plantarum</i>	[1]
<i>Dioscorea opposita</i> Thunb.	polysaccharides	immunomodulatory activity antioxidant Protection	<i>L. plantarum</i> <i>S. cerevisiae</i>	[2,3]
<i>Panax ginseng</i> C. A. Mey.	ginsenosides	metabolic disorders	<i>Aspergillus</i> spp. Monascus	[4,5]
<i>Polygonatum sibiricum</i> Red.	organic acids γ -aminobutyric acid	hypoglycemic and hypolipidemic activity antioxidant activity	<i>L. brevis</i> Lactobacillus spp.	[6,7]
<i>Polygonatum odoratum</i> (Mill.) Druce.	polysaccharides	antimicrobial activity antioxidant activities	<i>L. johnsonii</i> Yeast <i>Aspergillus</i>	[8,9]
<i>Astragalus membranaceus</i> (Fisch.) Bge.	polysaccharide	antioxidant activity thrombolytic activity depressive disorder	<i>B. natto</i> <i>B. longum</i> <i>L. fermentum</i> <i>L. paracasei</i> <i>C. kyushuensis</i> ;	[10-16]

<i>Asparagus cochinchinensis</i> (Lour.) Merr.	polysaccharides	antiinflammation alleviated liver injury	<i>L. acidophilus</i> <i>B. subtilis</i> <i>L. fermentum</i> <i>L. paracasei</i> <i>L. plantarum</i> <i>A. oryzae</i> <i>W. cibaria</i> <i>Cordyceps militaris</i>	[17-23]
<i>Ophiopogon japonicus</i> (L.f.) Ker-Gawl.	ruscogenin ophiopogonin	antithrombotic effect		[24]
<i>Lycium barbarum</i> L.	polyphenolics anthocyanin polysaccharides	hepatic protective; antioxidant activity prevention of ulcerative colitis	<i>L. plantarum</i> <i>L. casei</i> <i>L. bulgaricus</i> <i>L. rhamnosus</i> <i>A. tubingensis</i> <i>G. lucidum</i>	[25-31]
<i>Panax quinquefolium</i> L.	ginsenoside compound K	anti-allergy anti-cancer anti-fatigue anti-inflammatory		[32-35]
<i>Citrus grandis</i> (L.)Osbeck	polyphenols flavonoids naringenin naringin hesperetin	antioxidant activity anti-diabetic activity	<i>L. paracasei</i> <i>A. oryzae</i>	[36-38]
<i>Dimocarpus longan</i> Lour.	polysaccharide	immunomodulatory activity	<i>L. fermentum</i>	[39,40]
<i>Eucommia ulmoides</i> Oliv.	flavonoids organic acid	hyperlipidemia antibacterial activity	natural solid fermentation <i>Acetobacter rancens</i>	[41,42]

<i>Rubus chingii</i> Hu	phenolic acids	antioxidant activity	<i>L. fermentum</i>	[43-46]
	polysaccharides	antioxidant activity		
<i>Morus alba</i> L.	phenolic acids	antioxidant activity	<i>L. paracasei</i>	[35,47-50]
	alkaloids		<i>L. casei</i>	
			<i>P. acidilactici</i>	
			<i>L. casei</i>	
<i>Angelica sinensis</i> (Oliv.) Diels.	phenolics	antioxidant activity	<i>L. acidophilus</i>	[51]
	flavonoids		<i>L. paracasei</i>	
	isoquercitrin		<i>L. helveticus</i>	
			<i>L. plantarum</i>	
			<i>P. pentosaceus</i>	
			<i>A. oryzae</i>	
<i>Angelica dahurica</i> (Fisch. ex Hoffm.) Benth.	decursin	anti-pigment activity	<i>B. bifidum</i>	[52]
	Z-ligustilide	tyrosinase inhibitory		
<i>Codonopsis pilosula</i> (Franch.) Nannf.	phenolics	antioxidant activities	<i>B. lactis</i>	[53]
			<i>L. acidophilus</i>	
			<i>L. brevis</i>	
			Yeast	
<i>Curcuma Longa</i> L.	polysaccharides	antioxidant activity	<i>L. paracasei</i>	[54-58]
	phenolics	antiobesity	<i>R. oligosporus</i>	
	flavonoids	antioxidant	<i>M. purpureus</i>	
	curcuminoids	anti-inflammatory	<i>E. cristatum</i>	
			<i>L. fermentum</i>	
<i>Cistanche deserticola</i> Y.C.Ma	total acid and flavone;	anti-fatigue	<i>L. plantarum</i>	[59]

<i>Dendrobium officinale</i> Kimura et Migo	Polyphenols Polysaccharides beta-glucan inulin	relieve intestinal inflammation protection of alcoholic liver damage antioxidant activity	<i>S. fibuligera</i> <i>L. paracasei</i> <i>S. cerevisiae</i> FBKL2.8022; <i>W. anomalous</i> FBKL2.8023	[60-65]
<i>Ganoderma lucidum</i> (leyss. ex Fr.) Karst.	polysaccharide	alleviate immunosuppression nephroprotection	<i>B. longum</i> <i>L. acidophilus</i> <i>L. fermentum</i> <i>G. frondosa</i>	[66-68]
<i>Gastrodia elata</i> B1.	gastrodin parishin	antioxidant activity anti-fatigue		[69]
<i>Cornus officinalis</i> Sieb.et Zucc.	gallic acid loganin ursolic acid oleanolic acid polysaccharide	antibacterial anti-inflammatory	<i>B. subtilis</i> <i>B. bifidum</i>	[70]
<i>Citrus medica</i> L. var. <i>sarcodactylis</i> Swingle	polysaccharides flavonoids hesperidin coumarins	Positive regulation of human gut microbiota and metabolome	gut microbiota	[71]
<i>Hippophae rhamnoides</i> L.	phenolics flavonoids	hypolipidemic activity antioxidant and antimicrobial activity	<i>L. plantarum</i> <i>Z. mobilis</i> <i>L. casei</i> <i>P. acidilactici</i> <i>L. animalis</i> <i>P. pentosaceus</i>	[72-74]
<i>Ziziphus jujuba</i> Mill.	polyphenol quercetin	anti-obesity protection of chronic liver injury	<i>L. plantarum</i> <i>S. thermophilus</i>	[75-80]

	triterpenic acid	antioxidant activity	<i>L. acidophilus</i> <i>L. casei</i> <i>L. helveticus</i> <i>L. plantarum</i>	
<i>Siraitia grosvenorii</i> (Swingle.)C.Jeffrey ex A.M.Lu et Z.Y.Zhang	polysaccharide	hypoglycemic activity	gut microbiota (in vitro)	[81]
<i>Lonicera japonica</i> Thunb.	polyphenols puerarin total isoflavones	osteoporosis alcoholic liver disease	<i>L. plantarum</i> <i>L. rhamnosus</i>	[82,83]
<i>Hovenia dulcis</i> Thunb.	acetic acid gamma-amino-n-butyric acid	antioxidant activity alcohol degradation activities hepatoprotective effects	<i>S. cerevisiae</i> <i>A. aceti</i> <i>B. subtilis</i> <i>L. plantarum</i>	[84,85]
<i>Nelumbo nucifera</i> Gaertn.	flavonoids	anti-adipogenic effect anti-obesity	<i>E. faecium</i> <i>E. hirae</i>	[86,87]
<i>Pueraria lobata</i> (Willd.)Ohwi	kaempferol 3-rhamnoside 4'-xyloside puerarin xyloside	antioxidant capacity xanthine oxidase inhibition ability hepatoprotective activity	<i>L. fermentum</i>	[88-90]
<i>Taraxacum mongolicum</i> Hand.-Mazz.	flavonoids	antioxidant activity	<i>L. plantarum</i> <i>S. cerevisiae</i>	[91,92]
<i>Portulaca oleracea</i> L.	polyphenol flavonoids	atopic dermatitis	Bacillus sp. DU-106 <i>L. plantarum</i> <i>L. brevis</i> <i>L. rossiae</i>	[93,94]

<i>Coix lacryma-jobi</i> L.var.mayuen.(Roman.)Stapf	polysaccharides	antioxidant activity antiaging activity	<i>P. pentosaceus</i> <i>L. mesenteroides</i> <i>L. kunkeei</i> <i>B. natto</i> Bifidobacterium spp. <i>M. purpureus</i> <i>S. cerevisiae</i> <i>L. fermentum</i> <i>L. plantarum</i>	[95-98]
<i>Lilium brownie</i> var.viridulum Baker	F.E.Brown hexadecanoic acid methyl ester 22-tetrahydroxy-5alpha-cholestan-6-one-3-O-beta-d-allopyranoside 22-O-(6-deoxy-Alpha-l-mannopyranosyl)-3-O-beta-d-glucopyranosyl-pregn-5-en-20-one 1-O-trans-feruloylglycerol 3,4 dihydroxybenzoic acid	protecting lung health antioxidant activity		[99,100]
<i>Rosa rugosa</i> Thunb	polysaccharides total phenols total flavonoids gallic acid quercetin p-coumaric acid	antioxidant capacity	<i>L. plantarum</i> <i>B. subtilis natto</i>	[101-103]

<i>Senna obtusifolia</i> (L.) H. S. Irwin & Barneby	anthraquinone flavonoids polyphenols	enhancing intestinal peristalsis alleviating constipation	Yeast	[104,105]
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