

The evolution and significance of medicine and food homology

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Historical insights into medicine and food homology (MFH)

Evolution of the MFH theory

MFH, a basic concept in traditional Chinese medicine (TCM), suggests that many materials function as both food and medicine, providing nourishment and simultaneously treating ailments. This concept has evolved significantly throughout TCM history^[1]. Integral to this evolution was the discovery of certain materials with dual purposes during early searches for food. These materials not only offer sustenance and nutrition but are also capable of treating simple illnesses^[2]. During the Western Zhou period, the court system of the “Sangong Jiuqing system” (Three Lords and Nine Ministers), along with the establishment of dedicated food officials and food physicians, laid the foundation for a national medical system and contributed to the development of the MFH theory^[3]. *The Inner Canon of Yellow Emperor* (黄帝内经), *Shennong’s Classic of Materia Medica* (神农本草经), and *Classic of Questioning* (难经) provide a detailed theoretical framework of MFH, discussing the four natures of drugs (cold, hot, warm, and cool), the five flavors (pungent, sweet, sour, bitter, and salty), and their toxicities. Additionally, these texts highlighted that foods offered not only vital nutrition but also therapeutic properties similar to drugs^[4–6]. During the Eastern Han Dynasty, Zhang Zhongjing’s *Treatise on Cold Pathogenic and Miscellaneous Diseases* (伤寒杂病论) and *Synopsis of Formulas for the Golden Chamber* (金匮要略方论) integrated the concepts of food and medicine^[7,8]. In the Tang Dynasty, Sun Simiao’s *Essential*

Recipes for Emergent Use Worth A Thousand Gold (备急千金要方) emphasized dietary therapy, highlighting the medicinal value of foods^[9]. This concept was further elaborated during the Song and Yuan Dynasties in works such as *Taiping Holy Prescriptions for Universal Relief* (太平圣惠方) and *Principles of Correct Diet* (饮膳正要), enriching medicinal dietetics^[10]. The Ming and Qing periods saw further refinement of texts, such as the *Compendium of Materia Medica* (本草纲目), advancing the study of medicinal dietetics^[11,12]. These historical developments collectively underscore the significant role of the MFH in TCM and its evolving nature over the centuries.

Herbal origins of MFH

In ancient Chinese herbal medicine, the concept of MFH was primarily embodied in two categories: herbal texts, mainstream herbal texts, and food-specific herbal texts. The *Shennong Bencao Jing*, the earliest specialized herbal medicinal book in China, documents 59 types of dual-purpose materials as medicine and food, including Chinese dates, goji berries, coix seeds, walnuts, lotus seeds, honey, and lily bulbs^[13]. These materials are widely used in daily diets, and their nourishing effects have been emphasized^[14]. However, the boundaries between food and medicine were yet to be explicitly defined. The emergence of food-related herbal texts clearly delineated the category of food in herbology, further emphasizing the role of food in treatment and health maintenance. In *Notes on Shennong’s Herbal Scriptures* (本草经集注) by Tao Hongjing of the Southern Dynasties, 82 types of

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medicines and food homologous materials were documented. This section categorizes fruits, vegetables, and grains, defining the scope of food-related materials in herbology^[15]. In the Tang Dynasty, Sun Simiao's *Essential Recipes for Emergent Use Worth A Thousand Gold*, which documented 155 types of MFH materials, included a "Food Treatment" section, discussing the therapeutic effects of food, thus elevating the significance of food therapy in health maintenance and ailment treatment^[16]. Subsequent works such as Meng Shen's *Materia Medica for Dietotherapy* (食疗本草), Hu Sihui's *Principles of Correct Diet*, Xue Ji's *Food Materia Medica* (食物本草), and Shen Lilong's *Summary of Food and Herbal* (食物本草会纂), documented 227, 230, 1689, and 608 types of MFH materials, respectively. These texts emphasize their roles in health preservation and disease prevention, delving into consumption methods and contraindications, indicating an increasing emphasis on the therapeutic use of food and the safety and functionality of dual-purpose TCMs^[17].

Connotation of MFH

MFH theory emphasizes the recognition of the intrinsic link between food and medicine, highlighting their common natural origins. Currently, the academic community generally believes that, in their quest for essential survival foods, ancient Chinese people serendipitously discovered substances that would later be recognized as TCM. These ancient people attributed dual value to foods that could cure diseases, thus laying the foundation for the concept of MFH. Modern people, in contrast, select medicines with nutritional value, incorporating them into the MFH category. The selection criteria differed between the two eras, resulting in a substantial difference in the number of medicinal and food homologous materials between ancient and contemporary times. However, the common goal is to use a daily diet to nurture the body and enhance health^[1]. This concept reveals the dual role of these materials as both a source of nutrition and a means of treating and preventing diseases. This underscores the importance of achieving physical and mental health through balanced diets and healthy lifestyles, reflecting an holistic health perspective and the pursuit of harmony between the human body and nature in TCM. Moreover, MFH is not only instrumental in medical practice but is also deeply rooted in traditional Chinese culture and philosophy, symbolizing the harmonious coexistence between humans and nature. As of November 17, 2023, nine new types of Chinese herbal medicines had been added, bringing the total number in the current directory to 102 (Table 1). These Chinese herbal medicines can be used both as food and medicine within the specified limits of raw material sources, usage scope, and dosage.

Definition and safety aspects for MFH

MFH refers to materials that are traditionally utilized as both food and medicine and are included in the Pharmacopoeia of the People's Republic of China, possessing the therapeutic properties of TCM and nutritional value of food. In recent years, escalating standard

of living, accelerated pace of population aging, and heightened emphasis on personal health have collectively fostered a burgeoning interest among consumers in functional health foods. The release of a catalog encompassing 102 homologous medicinal and food materials provides the groundwork for the development of health-promoting products from these sources.

Given their dual nature as both TCM and food, the usage and frequency of MFH materials far exceed those of typical Chinese medicinal materials, placing a premium on safety. A comprehensive consideration of factors such as consumable dosage, material properties, pharmacological effects, and health profile of individuals is imperative when utilizing these materials. Ignoring these aspects may result in potentially toxic side effects and pose a risk to human health. For instance, hawthorn is rich in flavonoids and proanthocyanidins, and has notable cardiogenic, diuretic, and vasodilatory effects. It is widely used to treat peripheral vascular diseases, hypertension, hyperlipidemia, and angina. As a nutrient-dense food, it provides iron, calcium, and vitamins, making it ideal for consumption as both a raw and processed food. However, owing to their high sugar content, diabetic individuals should limit its intake^[18].

In 2021, the National Health Commission of the People's Republic of China issued the "Regulations for the Management of the Catalog of Substances Traditionally Used as Both Food and Medicinal Materials." These regulations require safety evaluation procedures and MFH materials, and mandate dynamic management and monitoring of food safety risks for the items listed in the catalog. However, regulations on the use, application principles, contraindications, and quality control of these materials are lacking. Consequently, there is an ongoing need for the state to refine the regulations governing MFH materials, intensify market promotion efforts, strengthen market supervision, and enhance the exploration and utilization of China's traditional MFH resources.

The multifaceted value of MFH

MFH used as preventive medicine for enhanced healthcare

The Inner Canon of Yellow Emperor introduced the concept of "Zhi Weibing" (preventive treatment of disease), advocating disease prevention through daily dietary and lifestyle practices^[19]. The principle of MFH as a crucial component of TCM offers theoretical support for the utilization of Chinese medicinal materials in health enhancement and disease prevention. Since 2016, various long-term policies have actively promoted a healthy lifestyle and the concept of "Zhi Weibing," leading to a sustained increase in the public demand for health. These policy initiatives have been successful, particularly in terms of the market dynamics of MFH materials. Between March 2022 and February 2023, despite the lower sales share of MFH materials such as *Astragalus*, lily bulb, Chinese angelica, and Kudzu vine root in healthcare products, their annual growth rates increased to 103.4%, 104.6%, 106.1%, and 114.9%, respectively^[20]. This growth has significantly outpaced the overall market, indicating increasing integration of MFH materials into healthcare products.

Table 1
Comprehensive Catalogue of Dual-Use Ingredients in Medicine and Food Homology

No.	Names (Chinese/English)	Source (Latin name)	Family name	Parts to be consumed	Actions in TCM	Pharmacological Activities	Note
1	Ding Xiang/丁香/ Clove	<i>Eugenia caryophyllata</i> Thunb.	Myrtaceae	Flower Bud	To warm the middle energizer,downbear counterflow, tonify the kidney and assist yang.	Antioxidant, anti-microbial, anti-viral, anti-pyretic, analgesic, anesthetic, enhancing memory.	
2	Ba jiao Hui Xiang/八角茴 香/Chinese star anise	<i>Illicium verum</i> Hook.f.	Magnoliaceae	Mature Fruit	To warm yang,dissipate cold., regulate qi and relieve pain.	Anti-microbial, anti-viral, analgesic, oestrogenic, allergic, cytotoxic.	Also known as “Ba jiao” in spices
3	Dao Dou/刀豆/ Jack Bean	<i>Canavalia gladiata</i> (Jacq.) DC.	Fabaceae	Mature Seed	To moisten the intestines and open the bowels.	Antioxidant, anti-microbial, anti-tumor, hepatoprotective.	
4	Xiao Hui Xiang/小 茴香/Fennel	<i>Foeniculum vulgare</i> Mill.	Apiaceae	Mature Fruit	To dissipate cold,relieve pain, regulate qi and harmonize the stomach.	Anti-microbial, GI stimulant, hepatoprotective, analgesic, anti-inflammatory.	Leaves and stems can also be used for seasoning
5	Xiao ji/小蓟/Field Thistle Herb	<i>Cirsium setosum</i> (Willd.) MB.	Asteraceae	Above ground Parts	To cool the blood, stanch bleeding, dissipate stasis, remove toxin and disperse abscesses.	Hemostatic, coagulative, anti-microbial, anti- inflammatory, lipid metabolism-regulating, anti-ageing, anti-fatigue, anti-tumor.	
6	Shan Yao/山药/ Common Yam Rhizome	<i>Dioscorea opposita</i> Thunb.	Dioscoreaceae	Rhizome	To tonify spleen and stomach,engender fluids, nourish lung, tonify kidney and astringe essence.	Anti-diabetic, anti-hyperlipidemic, antioxidant, anti-tumor, immunomodulatory, spleen-stomach regulating.	
7	Shan Zha/山楂/ Hawthorn Fruit	<i>Crataegus pinnatifida</i> Bge. var. <i>Major</i> N.E.Br. <i>Crataegus pinnatifida</i> Bge.	Rosaceae	Mature Fruit	To promote digestion, invigorate the stomach, move qi, dissipate stasis, resolve turbidity and lower lipid.	Anti-hypertensive, anti-hyperlipidemic, anti-coagulant, anti-thrombotic, anti-tumor, hepatoprotective, antioxidant, anti-microbial, immunomodulatory, anti-diabetic, anti- inflammatory, hancing the digestive system.	
8	Ma Chi Xian/马齿 苋/Purslane Herb	<i>Portulaca oleracea</i> L.	Portulacaceae	Above ground Parts	To clear heat, remove toxin, cool the blood, stop bleeding, and stop dysentery.	Neuroprotective, anti-diabetic, antioxidant, anti-tumor, anti-microbial, anti-inflammatory, anti-tussive, antiasthmatic, hepatoprotective.	
9	Wu Mei/乌梅/ Smoked Plum	<i>Prunus mume</i> (Sieb.) Sieb.et Zucc.	Rosaceae	Pre-mature Fruit	To astringe the lung and intestines, engender fluid, and quiet ascaris.	Anti-diabetic, anti-hyperlipidemic, lowering uric acid, anti-osteoporotic, hepatoprotective, anti-H. pylori, enhancing intestinal motility, anti-inflammatory, antioxidant, improving blood fluidity effects, inhibiting platelet aggregation, anti-tumor, anti-microbial, anti-viral, immunomodulatory, skin whitening, stimulating salivary secretion, anti-fatigue, anti-allergic, analgesic.	

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Table 1 (Continued)							
No.	Names (Chinese/English)	Source (Latin name)	Family name	Parts to be consumed	Actions in TCM	Pharmacological Activities	Note
10	Mu Gua/木瓜/ Common Flowering Qince Fruit	<i>Chaenomeles speciosa</i> (Sweet) Nakai	Rosaceae	Pre-mature Fruit	To relax sinews,activate collaterals,harmonize the stomach and resolve dampness.	Hepatoprotective, anti-inflammatory, immunostimulatory, hepatoprotective, antiulcer, intestinal protective, anti-tumor.	
11	Huo Ma Ren/火麻 仁/Hemp seed	<i>Cannabis sativa</i> L.	Moraceae	Mature Fruit	To moisten the intestines and open the bowels.	Antiulcer, laxative, anti-diarrheal, cardioprotective, lipid metabolism-regulating, antioxidant, platelet- aggregation-inhibitory, anti-hypertensive, sedative, anti-convulsant, sleep-enhancing, immunomodulatory, anti-fatigue, anti-inflammatory.	
12	Dai Dai Hua/代代 花/Aurantii Fructus	<i>Citrus aurantium</i> L.var. <i>amara</i> Engl .	Rutaceae	Flower Bud	To regulate <i>qi</i> , soothe the chest, increase the appetite, stop vomiting.	Antioxidant, anti-microbial, anti-tumor, anti-viral, hypolipidemic, enhancing gastrointestinal motility.	The fruit is commonly used as Zhi Qiao (Orange Fruit)
13	Yu Zhu/玉 竹/Fragrant Solomonseal Rhizome	<i>Polygonatum odoratum</i> (Mill.) Druce	Liliaceae	Rhizome	To nourish <i>yin</i> , moisten dryness, and engender fluid to quench thirst.	Anti-tumor, anti-obesity, anti-diabetic, antioxidant, anti-aging, immunomodulatory, anti-microbial.	
14	Gan Cao/甘草/ Licorice Root	<i>Glycyrrhiza uralensis</i> Fisch. <i>Glycyrrhiza inflata</i> Bat. <i>Glycyrrhiza glabra</i> L.	Fabaceae	Root and Rhizome	To tonify spleen, tonify <i>qi</i> , clear heat, remove toxin, dispel phlegm, suppress cough, relax spasm, relieve pain, and moderate drug actions.	Neuroprotective, sedative, anti-depressive, oestrogenic, anti-viral, anti-tumor, anti-microbial, antioxidant, hepatoprotective, anti-inflammatory.	
15	Bai Zhi/白芷/ Dahurian Angelica Root	<i>Angelica dahurica</i> (Fisch. ex Hoffm.) Benth et Hook.f. <i>Angelica dahurica</i> (Fisch.ex Hoffm.) Benth. et Hook.f.var. <i>formosana</i> (Boiss.) Shan et Yuan	Apiaceae	Root	To release the exterior, dissipate cold, dispel wind, relieve pain, open nose orifices, dry dampness and relieve abnormal vaginal discharge, disperse swelling and expel pus.	Anti-inflammatory, anti-tumor, antioxidant, analgesic, anti-viral, anti-microbial, cardiovascular-active, neuroprotective, hepatoprotective, affecting skin diseases.	
16	Bai Guo/白果/ Ginkgo Seed	<i>Ginkgo biloba</i> L.	Ginkgoaceae	Mature Seed	To astringe the lung, stop wheezing, stop vaginal discharge, and reduced urination.	Antioxidant, anti-bacterial, anti-tumor, neuromodulating.	
17	Bai Bian Dou/白扁 豆/White Hyacinth Bean	<i>Dolichos lablab</i> L.	Fabaceae	Mature Seed	To fortify the spleen, resolve dampness, harmonize the middle energizer, and remove summer-heat.	Anti-microbial, anti-viral, antioxidant, anti- inflammatory, anti-diabetic, hepatoprotective, neuroprotective.	
18	Bai Bian Dou Hua/ 白扁豆花/Flower of White Hyacinth Bean	<i>Dolichos lablab</i> L.	Fabaceae	Flower	To fortify the spleen, resolve dampness, harmonize the middle energizer, and remove summer-heat.	Antioxidant, hypoglycemic.	

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Table 1
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No.	Names (Chinese/English)	Source (Latin name)	Family name	Parts to be consumed	Actions in TCM	Pharmacological Activities	Note
19	Long Yan Rou(Gui Yuan)/龙眼肉 (桂圆)/Longan Aril	<i>Dimocarpus longan</i> Lour.	Sapindaceae	Aril	To tonify, replenish heart and spleen, nourish blood, and tranquilize the mind.	Antioxidant, anti-tyrosinase, antiglycation, anti-tumor, nootropic.	
20	Jue Ming Zi/决明子/Cassia Seed	<i>Cassia obtusifolia</i> L. <i>Cassia tora</i> L.	Fabaceae	Mature Seed	To clear heat, improve vision, moisten the intestines and open the bowels.	Antioxidant, CNS active, anti-tumor, anti-fungal, anti-bacterial, wound healing, anti-fertility, anti-leishmanial.	Requires processing before use
21	Bai He/百合/Lily Bulb	<i>Lilium lancifolium</i> Thunb. <i>Lilium brownie</i> F.E.Brown var. <i>viridulum</i> Baker <i>Lilium pumilum</i> DC.	Liliaceae	Succulent Scales	To nourish <i>yin</i> , moisten the lung clear the heart, and tranquilize the mind.	Anti-tumor, antioxidant, anti-inflammatory, anti-depressive, hypoglycemic, hepatoprotective, anti-bacterial.	
22	Rou Dou Kou/肉豆蔻/Nutmeg	<i>Myristica fragrans</i> Houtt.	Myristicaceae	Endosperm and Seed coat	To warm the middle energizer, move <i>qi</i> , astringe the intestines, stop and diarrhea.	Antioxidant, anti-microbial, anti-tumor, hepatoprotective, anti-inflammatory, anti-depressive, cardioprotective.	The seed coat is used only as a seasoning
23	Rou Gui/肉桂/Cassia Bark	<i>Cinnamomum cassia</i> Presl	Lauraceae	Bark	To tonify fire, assist <i>yang</i> conduct fire back to its origin, dissipate cold, relieve pain, warm and unblock the meridians.	Antioxidant, anti-inflammatory, anti-diabetic, anti-microbial, anti-tumor, anti-cholesterol, anti-hyperlipidemic, advanced glycation end products (AGEs), cardiovascular-risk-reducing, neurological-preventive.	Also known as "Gui Pi" in spices
24	Yu Gan Zi/余甘子/Emblic Leaf/flower Fruit	<i>Phyllanthus emblica</i> L.	Euphorbiaceae	Mature Fruit	To clear heat, cool the blood promote digestion, invigorate the stomach, engender fluid, suppress cough.	Antioxidant, analgesic, anti-pyretic, anti-inflammatory, anti-microbial, anti-viral, anti-tumor, immunomodulatory, anti-fatigue, hypoglycemic, anti-hyperlipidemic, neuroprotective, multiorgan functional protective.	
25	Fo Shou/佛手/Finger Citron	<i>Citrus medica</i> L.var. <i>sarcodactylis</i> Swingle	Rutaceae	Fruit	To soothe the liver, regulate <i>qi</i> , harmonize the stomach, relieve pain, dry dampness and resolve phlegm.	Expectorant, anti-tussive, antiasthmatic, anti-inflammatory, antioxidant, anti-microbial, anti-tumor, immunomodulatory, anti-depressive, anti-hypertensive, anti-spasmodic, anti-aging.	
26	Xing Ren(Tian Ku)/杏仁 (甜、苦) /Apricot Seed(sweet,bitter)	<i>Prunus armeniaca</i> L.var. <i>ansu</i> Maxim <i>Prunus sibirica</i> L. <i>Prunus mandshurica</i> (Maxim) Koehne <i>Prunus armeniaca</i> L.	Rosaceae	Mature Seed	To direct <i>qi</i> downward, suppress cough, relieve wheezing, moisten the intestines and open the bowels.	Anti-tussive, antiasthmatic, anti-inflammatory, analgesic, antioxidant, anti-tumor, cardioprotective, anti-fibrotic, immunomodulatory, bowel relaxing, insecticidal.	Bitter Apricot Seed must be processed before use

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Table 1 (Continued)							
Names		Source		Parts to be consumed	Actions in TCM	Pharmacological Activities	Note
No.	(Chinese/English)	(Latin name)	Family name				
27	Sha Ji/沙棘/ Seabuckthorn Fruit	<i>Hippophae rhamnoides</i> L.	Elaeagnaceae	Mature Fruit	To tonify the spleen, promote digestion, suppress cough, dispel phlegm, activate the blood todissipate stasis.	Antioxidant, immunomodulatory, anti-tumor, hepatoprotective, anti-stress, anti-ageing, cardioprotective, anti-atherogenic, anti-bacterial, anti-viral, anti-radiation, radio protective.	
28	Qian Shi/芡实/ Gordon Euryale Seed	<i>Euryale ferox</i> Salisb.	Nymphaeaceae	Mature Endosperm	To tonify kidney, secure essence, tonify spleen, check diarrhea, dispel dampness, and relieve abnormal vaginal discharge.	Antioxidant, anti-inflammatory, anti-diabetic, hypoglycemic, hepatoprotective, cardioprotective, anti-bacterial, cytotoxic, anti-tumor, anti-fatigue, anti-depressive.	
29	Hua Jiao/花椒/ Pricklyash Peel	<i>Zanthoxylum schinifolium</i> Sieb.et Zucc. <i>Zanthoxylum bungeanum</i> Maxim.	Rutaceae	Mature Pericarp	To warm the middle energizer, relieve pain, kill worms and relieve itching.	Anti-inflammatory, analgesic, anesthetic, neuroprotective, anti-obesity, anti-diabetic, anti-neoplastic, anti-bacterial, antioxidant.	Sichuan pepper fruits can be used as a seasoning
30	Chi Xiao Dou/赤小豆/Red Adzuki Bean	<i>Vigna umbellata</i> Ohwi et Ohashi <i>Vigna angularis</i> Ohwi et Ohashi	Fabaceae	Mature Seed	To promote urination, alleviate edema, remove toxin and expel pus.	Antioxidant, anti-microbial, anti-inflammatory, anti-allergic, hepatoprotective, nephroprotective, anti-diabetic, blood pressure-regulating, anti-hyperlipidemic, anti-obesity, anti-tumor.	
31	Mai Ya/麦芽/ Germinated Barley	<i>Hordeum vulgare</i> L.	Gramineae	Processed product of mature fruit dried after sprouting	To move <i>qi</i> , promote digestion fortify the spleen, increase the appetite, lactifuge, relieve distention.	Anti-inflammatory, anti-fatigue, diuretic, antioxidant, anti-viral, anti-protozoal, astringent, demulcent, digestive, expectorant, febrifuge, anti-mutagenic, emollient.	
32	Kun Bu/昆布/Kelp or Tangle	<i>Laminaria japonica</i> Aresch. <i>Ecklonia kurome</i> Okam.	Laminariaceae Alariaceae	Thallus	To resolve phlegm,soften hardness, dissipate binds, promote urination,and alleviate edema.	Lipid metabolism-regulating, blood viscosity-reducing, hypoglycemic, anti-hypertensive, anti-coagulant, immunomodulatory, anti-tumor, anti-mutagenic, radio protective, anti-fatigue, antioxidant, anti-viral, anti-microbial, anti-fibrotic	
33	Zao(Da Zao,Hei Zao)/枣(大枣、黑枣) / Chinese-Date	<i>Ziziphus jujuba</i> Mill.	Rhamnaceae	Mature Fruit	To tonify the middle energizer tonify <i>qi</i> , nourish the blood,and tranquilize the mind.	Hepatoprotective, anti-inflammatory, anti-complementary, anti-convulsant, hematopoietic, antioxidant, anti-microbial, anti-tumor.	
34	Luo Han Guo/罗汉果/Grosvenor Momordica Fruit	<i>Siralitia grosvenorii</i> (Swingle.) C.Jeffrey ex A.M.Lu et Z.Y.Zhang	Cucurbitaceae	Fruit	To clear heat, moisten the lung, soothe the throat, restore the voice, lubricate intestine and open the bowels.	Anti-tussive, expectorant, antiasthmatic, antioxidant, anti-diabetic, anti-hyperlipidemic, anti-inflammatory, hepatoprotective, anti-bacterial, anti-viral, hypoglycemic, immunomodulatory.	

(Continued)

Table 1

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No.	Names (Chinese/English)	Source (Latin name)	Family name	Parts to be consumed	Actions in TCM	Pharmacological Activities	Note
35	Yu Li Ren/郁李仁/Chinese Dwarf Cherry Seed	<i>Prunus humilis</i> Bge. <i>Prunus japonica</i> Thunb. <i>Prunus pedunculata</i> Maxim.	Rosaceae	Mature Seed	To moisten the intestines, open the bowels, direct qi downward and induce diuresis.	Promoting gastrointestinal peristalsis, anti-inflammatory, analgesic, anti-convulsant, anti-hypertensive.	
36	Jin Yin Hua/金银花/Japanese Honeysuckle Flower	<i>Lonicera japonica</i> Thunb.	Caprifoliaceae	Flower buds or Flowers with early bloom	To clear heat, remove toxin, and disperse wind-heat,	Anti-inflammatory, anti-microbial, anti-viral, hepatoprotective, antioxidant, hypoglycemic, anti-tumor.	
37	Qin Guo/青果/Chinese White Olive	<i>Canarium album</i> Raeusch.	Burseraceae	Mature Fruit	To clear heat, remove toxin, soothe the throat, and engender fluids.	Anti-inflammatory, analgesic, antioxidant, anti-tumor.	
38	Yu Xing Cao/鱼腥草/Heartleaf Houttuynia Herb	<i>Houttuynia cordata</i> Thunb.	Saururaceae	Fresh whole herb or Dried aboveground parts	To clear heat, remove toxin, disperse abscesses and expel pus, promote urination, and relieve stranguria.	Anaphylactic inhibitory, anti-mutagenic, anti-inflammatory, anti-viral, anti-obesity, antibacterial, anti-tumor, anti-allergic, anti-diabetic, antioxidant.	
39	Jiang/Sheng Jiang/Gan jiang/姜(生姜、干姜) /Ginger(	<i>Zingiber officinale</i> Rosc.	Zingiberaceae	Rhizome (with fresh rhizomes used for ginger and dried rhizomes for dried ginger)	Fresh Ginger: To release the exterior, dissipate cold, warm the middle energizer, stop vomiting, resolve phlegm, suppress cough, and reduce toxin of sea food. Zingiber: To warm the middle energizer dissipate cold, restore yang, promote blood circulation, warm the lung and resolve fluid retention.	Antioxidant, anti-tumor, anti-inflammatory, analgesic, hepatoprotective, anti-tumor.	
40	Zhi Ju Zi/枳椇子/Japanese Raisin Tree Seed	<i>Hovenia dulcis</i> Thunb.	Rhamnaceae	For medicinal use, the mature seeds; for culinary use, the fleshy, swollen fruit axis, leaves, and stems.	To clear heat, promote urination, and remove alcoholic toxin.	Accelerating detoxification of ethanol, hepatoprotective, antioxidant, anti-microbial, anti-diabetic.	
41	Gou Qi Zi/枸杞子/Barbary Wolfberry Fruit	<i>Lycium barbarum</i> L.	Solanaceae	Mature Fruit	To nourish the liver and kidney, replenish essence, and improve vision.	Antioxidant, immunomodulatory, anti-inflammatory, anti-atherosclerotic, anti-fibrotic, anti-mutagenic, anti-tumor, anti-radiation, anti-fatigue, anti-aging, anti-stress, anti-yeast, cardioprotective and wound healing.	

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Table 1 (Continued)							
No.	Names (Chinese/English)	Source (Latin name)	Family name	Parts to be consumed	Actions in TCM	Pharmacological Activities	Note
42	Zhi Zi/梔子/Cape Jasmine Fruit	<i>Gardenia jasminoides</i> Ellis	Rubiaceae	Mature Fruit	To purge fire to relieve vexation, clear heat and drain dampness, cool the blood, remove toxin; topical application: disperse swelling and relieve pain.	Anti-hyperglycemic, anti-atherosclerotic, anti-inflammatory, anti-arthritis, anti-tumor, anti-apoptotic, antioxidant, anti-angiogenic, anti- thrombotic, anti-microbial, anti-bacterial, cytotoxic, astringent, emollient, refrigerant, diuretic.	
43	Sha Ren/砂仁/ Villous Anomum Fruit	<i>Anomum villosum</i> Lour. <i>Anomum villosum</i> Lour. var. <i>xanthioides</i> T.L. Wu et Senjen <i>Anomum longiligularg</i> T.L.Wu	Zingiberaceae	Mature Fruit	To resolve dampness, increase the appetite, warm the spleen, stop diarrhea, regulate <i>qi</i> and prevent miscarriage.	Gastrointestinal protective, analgesic, anti- inflammatory, anti-diarrheal, regulating intestinal microbiota, hypoglycemic, antioxidant.	
44	Pang Da Hai/胖 大海/Boat-fruited Sterculia Seed	<i>Sterculia lychnophora</i> Hance	Sterculiaceae	Mature Seed	To clear heat, moisten the lung, soothe the throat, restore the voice, moisten the intestines, and open the bowels.	Analgesic, anti-nociceptive effects, anti- inflammatory, anti-pyretic, antioxidant, antiulcer, anti-hypertensive, anti-microbial, neuroprotective, skin depigmenting, anti-obesity, laxative.	
45	Fu Ling/茯苓/ Indian Bread	<i>Poria cocos</i> (Schw.) Wolf	Polyporaceae	Sclerotium	To promote urination to drain dampness, fortify the spleen, and calm the heart.	Anti-inflammatory, immunomodulatory, anti-tumor, hypoglycemic.	
46	Xiang Yuan/香橼/ Citron fruit	<i>Citrus medica</i> L. <i>Citrus wilsonii</i> Tanaka	Rutaceae	Mature Fruit	To soothe the liver, regulate <i>qi</i> , soothe the middle, and resolve phlegm.	Hypoglycemic, anti-cholinesterase, anti-tumor, analgesic, anti-diabetic, anti-cholesterol, anti-hyperlipidemic, antiulcer, anthelmintic, anti-microbial, anti-fertility, anti-lithiatric, anti- inflammatory, estrogenic.	
47	Xiang Ru/香薷/ Chinese Mosla	<i>Mosla chinensis</i> Maxim. <i>Mosla chinensis</i> 'jiangxiangru'	Lamiaceae	Above ground Parts	To promote sweating, release the exterior pattern, resolve dampness and harmonize the middle energizer.	Adaptogenic, anti-bacterial, nutritional, insecticidal, antioxidant.	
48	Tao Ren/桃仁/ Peach Seed	<i>Prunus persica</i> (L.) Batsch <i>Prunus davidiana</i> (Carr.) Franch.	Rosaceae	Mature Seed	To activate the blood to eliminate stasis, moisten the intestines, open the bowels, suppress cough, and relieve wheezing.	Anti-ageing, anti-biofilm, protective against oxidative stress, inhibiting type II diabetes, Alzheimer's disease and obesity.	
49	Sang Ye/桑叶/ Mulberry Leaf	<i>Morus alba</i> L.	Moraceae	Leaf	To disperse wind-heat, clear the heat, moisten dryness, clear the liver, and improve vision.	Antioxidant, hypoglycemic, anti-cholesterol (affecting lipid metabolism), anti-obesity, anti-inflammatory, anti-tumor.	
50	Sang Shen/桑葚/ Mulberry Fruit	<i>Morus alba</i> L.		Fruit Spike	To replenish <i>yin</i> , nourish blood engender fluid, and moisten dryness.	Anti-hyperlipidemic, anti-diabetic, anti-obesity, anti-tumor, hepatoprotective, protective against cytotoxicity and oxidative stress, protective against brain damage.	

(Continued)

Table 1
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No.	Names (Chinese/English)	Source (Latin name)	Family name	Parts to be consumed	Actions in TCM	Pharmacological Activities	Note
51	Ju Hong/桔红 (橘红) /Red Tangerine Peel	<i>Citrus reticulata</i> Blanco	Rutaceae	Exocarp	To regulate <i>qi</i> , soothe the middle, dry dampness and resolve phlegm.	Anti-microbial, anti-tumor, neuropharmacological-active, anti-genotoxicity, antioxidant, cardiovascular-active, hepatoprotective, anti-hypercholesterolemic, anti-ageing potential.	
52	Jie Geng/桔梗/ Platycodon Root	<i>Platycodon grandiflorum</i> (Jacq.) A.DC.	Campanulaceae	Root	To diffuse the lung, soothe the throat, dispel phlegm, and expel pus.	Apophlegmatic, anti-tussive, immunostimulatory, anti-inflammatory, antioxidant, anti-tumor, anti-diabetic, anti-obesity, hepatoprotective, cardiovascular-active.	
53	Yi Zhi Ren/益智仁/Sharpleaf Glangal Fruit	<i>Alpinia oxyphylla</i> Miq.	Zingiberaceae	The shelled part is called the nut kernel, and the fruit is used as a seasoning.	To warm the kidney, secure essence, reduce urination, warm the spleen, stop diarrheaaand constrain spittle.	Neuroprotective, anti-diarrheal, anti-diuretic, anti-neoplastic, antioxidant, anti-inflammatory, anti-allergic, viscera protective, anti-diabetic.	
54	He Ye/荷叶/Lotus Leaf	<i>Nelumbo nucifera</i> Gaertn.	Nymphaeaceae	Leaf	To clear summerheat, resolve dampness, upraise the clear yang, cool the blood, and stanch bleeding.	Anti-obesity, anti-inflammatory, antioxidant, cardioprotective, anti-tumor, hepatoprotective, hypoglycemic, anti-viral, anti-microbial, hemostatic.	
55	Lai Fu Zi/莱菔子/ Radish Seed	<i>Raphanus sativus</i> L.	Brassicaceae	Mature Seed	To promote digestion, relieve distention, direct <i>qi</i> downward and resolve phlegm.	Metabolic therapeutic, anti-inflammatory, anti-tumor, antioxidant, anti-bacterial, anti-hypertensive, CNS protective, anti-osteoporotic.	
56	Lian Zi/莲子/Lotus Seed	<i>Nelumbo nucifera</i> Gaertn.	Nymphaeaceae	Mature Seed	To tonify spleen, stop diarrhea and relieve abnormal vaginal discharge, tonify kidney, astringe essence, nourish the heart, and tranquilize the mind.	Anti-adipogenic, antioxidant, anti-tumor, cardiovascular, hepatoprotective, anti-inflammatory, anti-fertility, anti-microbial, anti-viral, hypoglycemic.	
57	Gao Liang Jiang/ 高良姜/Lesser Galangal Rhizome	<i>Alpinia officinarum</i> Hance	Zingiberaceae	Rhizome	To warm the stomach, stop vomiting, dissipate cold and relieve pain.	Anti-inflammatory, cytotoxicity, homeostasis, lipid metabolism-regulating, antioxidant, anti-viral, anti-microbial, anti-osteoporotic.	
58	Dan Zhu Ye/淡竹 叶/Lophatherum Herb	<i>Lophatherum gracile</i> Brongn.	Gramineae	Stem/Leaf	To dispel wind, unblock the collaterals, activate the blood, and promote lactation.	Anti-microbial, antioxidant, hepatoprotective, vasoconstrictive, anti-viral, cardioprotective, hypolipidemic.	
59	Dan Dou Chi/淡 豆豉/Fermented Soybean	<i>Glycine max</i> (L.) Merr.	Fabaceae	Fermented product of mature seeds	To release the exterior, relieve vexation, and disperse depressed heat.	Antioxidant, anti-hypertensive, anti-inflammatory, immunomodulatory, anti- α -glucosidase, neuroprotective, anti-tumor.	
60	Ju Hua/菊花/ Chrysanthemum Flower	<i>Chrysanthemum morifolium</i> Ramat.	Asteraceae	Capitulum inflorescence	To disperse wind, clear heat, pacify the liver, improve vision, clear heat and remove toxin.	Anti-microbial, antioxidant, anti-inflammatory, hepatoprotective.	

(Continued)

Table 1 (Continued)							
No.	Names (Chinese/English)	Source (Latin name)	Family name	Parts to be consumed	Actions in TCM	Pharmacological Activities	Note
61	Ju Ju/菊苣/Blue sailors	<i>Cichorium glandulosum</i> Boiss.et Huet <i>Cichorium intybus</i> L.	Asteraceae	Above ground Parts or Root	To clear the liver, disinherit gallbladder, invigorate the stomach, promote digestion, promote urination and relieve swelling.	Anti-microbial, antioxidant, anti-inflammatory, anti- diabetic, hepatoprotective.	
62	Huang Jie Zi/黄芥 子/Mustard Seed	<i>Brassica juncea</i> (L.) Czern.et Coss	Brassicaceae	Mature Seed	To warm the lung, sweep phlegm, disinherit qi, dissipate bind, unblock the collaterals and relieve pain.	Anti-tumor, antioxidant, anti-obesity, anti-viral, anti-bacterial, anti-inflammatory, therapeutic effect on diabetic cataract, anti-hyperglycemic, anti-depressive.	
63	Huang Jing/黄 精/Solomonseal Rhizome	<i>Polygonatum kingianum</i> Coll.et Hemsl. <i>Polygonatum sibiricum</i> Red. <i>Polygonatum cyrtoneema</i> Hua	Liliaceae	Rhizome	To tonify qi, nourish yin, fortify the spleen, moisten the lung, and tonify the kidney.	Immunomodulatory, glycemic-regulating, anti-hyperlipidemic, antioxidant, anti-tumor, anti-bacterial.	
64	Zi Su/紫苏/Perilla Leaf	<i>Perilla frutescens</i> (L.) Britt.	Lamiaceae	Leaf(or with tender branches)	To release the exterior, dissipate cold, move qi, and harmonize the stomach.	Antioxidant, anti-bacterial, anti-fungal, anti-allergic, anti-depressive, anti-inflammatory, anti-tumor.	
65	Zi Su Zi/紫苏子 (籽) /Perilla Fruit	<i>Perilla frutescens</i> (L.) Britt.	Lamiaceae	Mature Fruit	To direct qi downward, resolve phlegm, suppress cough, relieve wheezing, moisten the intestines, and relax the bowels.	Anti-tussive, anti-inflammatory, antioxidant, cardiovascular-preventive, anti-tumor, anti-arthritis, anti-rheumatoid arthritis.	
66	Ge Gen/葛根/ Kudzuvine Root	<i>Pueraria lobata</i> (Willd.) Ohwi	Fabaceae	Root	To release the flesh, reduce fever, engender fluid to quench thirst, promote eruption, upraise the middle qi, stop diarrhea, unblock the meridians, activate collaterals, and remove alcoholic toxin.	Anti-pyretic, analgesic, anti-microbial, anti- hypertensive, hypoglycemic, hypolipidemic, antioxidant.	
67	Hei Zhi Ma/黑芝 麻/Black Sesame	<i>Sesamum indicum</i> L.	Pedaliaceae	Mature Seed	To tonify liver-kidney, replenish essence and blood, and moisten the intestines.	Antioxidant, anti-tumor, anti-pyretic, anti- hypertensive, hepatoprotective, anti-inflammatory.	Also known as “flax, sesame” in spices
68	Hei Hu Jiao/黑胡 椒/Black Pepper	<i>Piper nigrum</i> L.	Piperaceae	Pre-mature or Mature Fruit	To warm the middle energizer, dissipate cold, direct qi downward, and resolve phlegm.	Antioxidant, anti-obesity, anti-tumor, anti- pyretic, anti-convulsant, anti-thyroid, anti-fungal, anti-bacterial, insecticidal, hepatoprotective, anti-asthmatic, larvicidal, anti-hypertensive, anti-inflammatory, anti-diabetic, anti-diarrheal, bioavailability enhancing, immunomodulatory, anti- epileptic, anti-fertility, GI stimulant, lipid metabolism accelerator, CNS stimulant, diuretic, blood-purifying and anti-platelet.	Known as “white pepper” in spices

(Continued)

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No.	Names (Chinese/English)	Source (Latin name)	Family name	Parts to be consumed	Actions in TCM	Pharmacological Activities	Note
69	Huai Hua/槐花/ Pagodatree Flower	<i>Sophora japonica</i> L.	Fabaceae	Flower	To cool the blood, stop bleeding, clear the liver and purge fire.	Anti-inflammatory, anti-bacterial, anti-viral, anti-osteoporotic, antioxidant, radical scavenging, anti-hyperglycemic, anti-obesity, anti-tumor, and hemostatic, whitening.	
70	Huai Mi/槐米/ Pagodatree Flower buds	<i>Sophora japonica</i> L.	Fabaceae	Flower Bud	To cool the blood, stop bleeding, clear the liver and purge fire.	Anti-inflammatory, anti-bacterial, anti-viral, anti-osteoporotic, antioxidant, radical scavenging, anti-hyperglycemic, anti-obesity, anti-tumor, and hemostatic effects, whitening.	
71	Pu Gong Ying/蒲公英 公英/Dandelion	<i>Taraxacum mongolicum</i> Hand.-Mazz. <i>Taraxacum borealisinense</i> Kitam.	Asteraceae	Whole Plant	To clear heat, remove toxin, disperse swelling, dissipate bind, promote urination and relieve stranguria.	Antioxidant, anti-bacterial, anti-inflammatory, anti-viral, cytotoxic, diuretic and hepatoprotective.	
72	Fei Zi/榧子/Grand Torreyia	<i>Torreya grandis</i> Fort.	Taxaceae	Mature Seed	To kill worms, eliminate accumulation, moisten the lung, suppress cough, moisten dryness and open the bowels.	Anti-inflammatory, antioxidant.	
73	Suan Zao, Suan Zao Ren/酸枣、酸枣仁/Spine Date Seed	<i>Ziziphus jujuba</i> Mill. var. <i>spinosa</i> (Bunge) Hu ex H.F.Chou	Rhamnaceae	Flesh, Mature Seed	To nourish the heart, tonify the liver, calm the heart, tranquilize the mind, relieve sweating, and engender fluid.	Sedative and hypnotic, nootropic, anti-inflammatory, antioxidant, anti-hypertensive, hypolipidemic, anti-aging, anti-tumor.	
74	Xian Bai Mao Gen, Gan Bai Mao Gen/鲜白茅根、干白茅根/Lalang Grass Rhizome	<i>Imperata cylindrica</i> Beauv. var. <i>major</i> (Nees) C.E.Hubb.	Gramineae	Rhizome	To cool the blood, stanch bleeding, clear heat, and promote urination.	Antioxidant, anti-inflammatory, anti-tumor, immunomodulatory, hemostatic, lipid metabolism-regulating.	
75	Xian Lu Gen, Gan Lu Gen/鲜芦根、干芦根/Phragmitis Rhizoma	<i>Phragmites communis</i> Trin.	Gramineae		To clear heat, purge fire, engender fluid to quench thirst, relieve vexation, check vomiting, and disinhibit urine.	Antioxidant, anti-tumor, hepatoprotective and nephroprotective activity, lipid metabolism-regulating.	
76	Ju Pi/or Chen Pi/橘皮 (或陈皮) Dried Tangerine Peel	<i>Citrus reticulata</i> Blanco	Rutaceae	Mature Pericarp	To regulate qi, fortify the spleen, dry dampness and resolve phlegm.	Regulating blood/hepatic lipid, anti-thrombotic, anti-atherosclerotic activity, cardioprotective, antilucer, gastroenterological therapeutic, antiasthmatic, chronic obstructive pulmonary therapeutic, hepatoprotective, anti-tumor, anti-inflammatory, antioxidant, neuroprotective, anti-viral, anti-convulsion, anti-depressive.	

(Continued)

Table 1 (Continued)							
Names		Source	Parts to be consumed		Actions in TCM	Pharmacological Activities	Note
No.	(Chinese/English)	(Latin name)	Family name				
77	Bo He/薄荷/ Peppermint	<i>Mentha haplocalyx</i> Briq.	Lamiaceae	Above ground Parts	disperse wind-heat, clear and soothe head and eyes, soothe the throat, romote eruption, soothe the liver, and move <i>qi</i> .	Antioxidant, anti-microbial, anti-viral, anti-inflammatory, insecticidal, larvicidal, anti-tumor, radioprotective, anti-diabetic.	
		<i>Mentha arvensis</i> L.	Lamiaceae	Leaf, Tender Buds	To promote urination, drain dampness, fortify the spleen, stop diarrhea, relieve impediment, expel pus, remove toxin and dissipate bind.	Anti-tumor, hypoglycemia, improving liver function, regulating intestinal microbiota, improving spleen function, anti-inflammatory.	Used only as a seasoning
78	Yi Yi Ren/薏苡仁/ Coix Seed	<i>Coix lacryma-jobi</i> L.var. <i>mayuen</i> (Roman.) Stapf	Gramineae	Mature Endosperm	To unblock <i>yang</i> , dissipate bind, move <i>qi</i> and remove stagnation.	Platelet-aggregation-inhibitory, anti-hyperlipidemic, anti-atherosclerotic, myocardial cell-protective, vascular endothelial-cell-protective, anti-tumor, anti-bacterial, antiasthmatic, antioxidant.	
79	Xie Bai/薤白/ Longstamen Onion Bulb	<i>Allium macrostemon</i> Bge. <i>Allium chinense</i> G.Don	Liliaceae	Bulb	To tonify the kidney, secure essence, reduce urination, nourish the liver and improve vision.	Anti-complementary, anti-tumor, antioxidant, anti-microbial, anti-inflammatory, anti-hypertensive, anti-aging, anti-thrombotic, anti-diabetic, neuroprotective, anti-osteoporotic.	
80	Fu Pen Zi/覆 盆子/Palmleaf Raspberry Fruit	<i>Rubus chingii</i> Hu	Rosaceae	Fruit	To nourish the heart, tonify the liver, calm the heart, tranquilize the mind, relieve sweating, and engender fluid.	Antioxidant, analgesic, anti-inflammatory, anti-platelet, anti-thrombotic, anti-depressive, anti-mutagenic, anti-emetic, fibrinolytic and cytotoxic.	
81	Huo Xiang/藿香/ Cablin Patchouli Herb	<i>Pogostemon cablin</i> (Blanco) Benth.	Lamiaceae	Aboveground Parts	To resolve turbidity with aromatic medicinals, harmonize the middle, stop vomiting, and release the exterior and summerheat.	Anti-inflammatory, analgesic.	
82	Wu Shao She/乌 梢蛇/Black-tail Snake	<i>Zaocys dhumnades</i> (Cantor)	Colubridae	Skinned and eviscerated whole snake	To dispel wind, unblock the collaterals, and arrest convulsions.	Immunostimulatory, anti-tumor, antioxidant, anti-fatigue, hypoglycemic, hypolipidemic, anti-hypertensive, hepatoprotective.	Only Black-tail Snake that are artificially bred with permission from the forestry department may be used
83	Mu Li/牡蛎/Oyster Shell	<i>Ostrea gigas</i> Thunberg <i>Ostrea talienwhanensis</i> Crosse <i>Ostrea rivularis</i> Gould	Ostreidae	Shell	To tranquilize the mind by heavy settling, subdue <i>yang</i> , replenish <i>yin</i> , soften hardness and dissipate bind.	Hematological-disease-inhibitory, anti-aging, anti-tumor, immunomodulatory, anti-inflammatory, anti-fatigue.	

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No.	Names (Chinese/English)	Source (Latin name)	Family name	Parts to be consumed	Actions in TCM	Pharmacological Activities	Note
84	E Jiao/阿胶/ Donkey-hide Glue	<i>Equus asinus</i> L.	Equidae	Solid glue made from dried or fresh skins, boiled and concentrated	To nourish blood, replenish <i>yin</i> , moisten dryness, and stanch bleeding.	Promoting gastrointestinal peristalsis, promoting the secretion of the digestive system, anti-hypertensive, hypolipidemic, anti-ischemic, resisting stones.	
85	Ji Nei Jin/鸡内金/Chicken's Gizzard-skin	<i>Gallus gallus domesticus</i> Brisson	Phasianidae	Gizzard Lining	To invigorate the stomach, promote digestion, astringe essence, stop seminal emission, relieve stranguria, and expel stone.	Wound healing, anti-microbial, anti-microbial on oral use, immunomodulatory, skin-care, anti-tumor, anti-diabetic, cardioprotective, hepatorenal protective activity, neuroprotective, anti-aging, anti-atherosclerotic, antidote.	
86	Feng Mi/蜂蜜/ Honey	<i>Apis cerana</i> Fabricius <i>Apis mellifera</i> Linnaeus	Apidae Apidae	Honey produced by bees	To tonify the middle energizer, moisten dryness, relieve pain, remove toxin; topical application: Promotetissue regeneration and promote wound healing.	Immunomodulatory, anti-inflammatory, analgesic, anti-tumor.	
87	Fu She(Qi She)/ 蝮蛇 (蕘蛇) / Long-nosed Pit Viper	<i>Agkistrodon acutus</i> (Guenther)	Viperidae	Eviscerated whole snake	To dispel wind, unblock the collaterals, and arrestconvulsions.	Anti-inflammatory, anti-fibrotic, anti-spasmodic, antioxidant, neuroprotective.	Only Long-nosed Pit Viper that are artificially bred with permission from the forestry department may be used
88	Dang Gui/当归/ Chinese Angelica	<i>Angelica sinensis</i> (Oliv.) Diels.	Apiaceae	Root	To nourish blood, activate blood, regulate menstruation, relieve pain, moisten the intestines and relax the bowels.	Anti-microbial, antioxidant, insecticidal, analgesic, anti-inflammatory, anti-tuberculosis, anti-dengue, anti-nociceptive, anti-angiogenic, anti-tumor, hyperlipidemic, hypopigmentary, osteolysis, larvicidal, nematocidal, sedative, sniffing, vasorelaxant and wound healing.	For use as a spice only
89	Shan Nai/山柰/Galanga Resurrectionlily Rhizoma	<i>Kaempferia galanga</i> L.	Zingiberaceae	Rhizome	To move qi, warm the middle energizer, promote digestion, and relieve pain.	Anti-tumor, anti-diabetic, antioxidant, anti-microbial, anti-osteoporotic, anti-inflammatory, anti-nociceptive, anti-convulsant.	Used only as a seasoning; labeled as "root, stem" in spices
90	Xi Hong Hua/西红花/Saffron	<i>Crocus sativus</i> L.	Iridaceae	Stigma	To activate blood, resolve stasis, cool the blood, remove toxin, relieve depression and tranquilize the mind.	Gastrointestinal regulating, anti-bacterial, insecticidal, antioxidant, anti-inflammatory, neuroprotective, anti-tumor, anti-diabetes	Used only as a seasoning; also known as "Zang Hong Hua" in spices
91	Cao Guo/草果/ Caoguo	<i>Amomum tsao-ko</i> Crevost et Lemaire	Zingiberaceae	Fruit	To dry dampness, warm the middle energizer, relieve malaria and dispel phlegm.	Anti-inflammatory, antioxidant, anti-tumor, anti-mutagenic, anti-microbial, anti-obesity, anti-hyperlipidemic, cardioprotective, neuroprotectives.	Used only as a seasoning;

(Continued)

Table 1
(Continued)

No.	Names (Chinese/English)	Source (Latin name)	Family name	Parts to be consumed	Actions in TCM	Pharmacological Activities	Note
92	Jiang Huang/姜黄/Turmeric	<i>Curcuma Longa</i> L.	Zingiberaceae	Rhizome	To break blood, move <i>qi</i> , unblock the meridians and relieve pain.	Anti-microbial, anti-parasitic, anthelmintic, anti-inflammatory, analgesic, antioxidant, anti-tumor, neuro-pharmacological, hypoglycemic, hepatoprotective, hypolipidemic, anti-angiogenic, immunomodulatory, anti-arthritis, antiulcer, antiasthmatic, cardioprotective, anti-snake-venom agents.	Used only as a seasoning; labeled as 'root, stem' in spices
93	Bi Ba/荜茇/Long Pepper	<i>Piper longum</i> L.	Piperaceae	Fruit or Mature Fruit Spike	To warm the middle energizer, dissipate cold, direct qi downward and relieve pain.	Antioxidant, anti-obesity, anti-tumor, anti-pyretic, anti-convulsant, anti-thyroid, anti-fungal, anti-bacterial, insecticidal, hepatoprotective, anti-asthmatic, larvicidal, anti-hypertensive, anti-inflammatory, anti-diabetic, anti-diarrheal, bioavailability enhancing, immunomodulatory, anti-epileptic, anti-fertility, GI stimulant, lipid metabolism accelerator, anti-tumor, CNS stimulant, diuretic, blood-purifying and anti-platelet.	Used only as a seasoning
94	Dang Shen/党参/Tangshen	<i>Codonopsis pilosula</i> (Franch.) Nannf <i>Codonopsis pilosula</i> Nannf. var. <i>modesta</i> (Nannf.) L.T. Shen <i>Codonopsis tangshen</i> Oliv.	Campanulaceae	Root	To fortify the spleen, replenish lung, nourish blood and engender fluids.	Immunomodulatory, hematopoietic-improving, cardioprotective, neuroprotection, gastrointestinal regulating, endocrine regulating, cytotoxic, anti-bacterial, anti-aging, antioxidant.	
95	Rou Cong Rong/肉苁蓉/Desert Living Cistanche	<i>Cistanche deserticola</i> Y.C. Ma	Orobanchaceae	Succulent Stem	To tonify the kidney <i>yang</i> , replenish essence and blood, moisten the intestines and open the bowels.	Neuroprotective, immunomodulatory, hormonal balancing, anti-fatigue, anti-inflammatory, hepatoprotective, antioxidant, anti-bacterial, anti-viral, anti-tumor.	
96	Tie Pi Shi Hu/铁皮石斛/Dendrobium Stem	<i>Dendrobium officinale</i> Kimura et Migo	Orchidaceae	Stem	To boost the stomach, engender fluids, nourish <i>yin</i> and clear heat.	Anti-tumor, anti-fatigue, antioxidant, anti-aging, anti-inflammatory, hepatoprotective, gastrointestinal protective, anti-diabetic, cardioprotective, anti-hypertensive, neuroprotective, immunomodulatory, anti-bacterial, anti-fungal, platelet-aggregation-inhibitory, anti-osteoporotic.	

(Continued)

Table 1
(Continued)

No.	Names (Chinese/English)	Source (Latin name)	Family name	Parts to be consumed	Actions in TCM	Pharmacological Activities	Note
97	Xi Yang Shen/西洋参/ American Ginseng	<i>Panax quinquefolium</i> L.	Araliaceae	Root	To tonify <i>qi</i> , nourish <i>yin</i> , clear heat, and engender fluid.	Anti-tumor, immunomodulatory, cardiovascular-improving, affecting metabolism, anti-oxidant, anti-inflammatory.	
98	Huang Qi/黄芪/ Milkvetch Root	<i>Astragalus membranaceus</i> (Fisch.) Bge. <i>var. mongholicus</i> (Bge.) Hsiao <i>Astragalus membranaceus</i> (Fisch.) Bge.	Fabaceae	Root	To tonify <i>qi</i> , upraise yang, secure the exterior, stop sweating, promote urination, alleviate edema, engender fluids, nourish blood, move stagnation, relieve impediment, expel toxin and pus, promote wound healing and promote tissue regeneration.	Immunostimulatory, tonic, antioxidant, hepatoprotective, diuretic, anti-diabetic, anti-tumor, expectorant.	
99	Ling Zhi/灵芝/ Glossy Ganoderma	<i>Ganoderma lucidum</i> (Leyss. ex Fr.) Karst. <i>Ganoderma sinense</i> Zhao, Xu et Zhang	Polyporaceae	Fruiting Body	To tonify <i>qi</i> , tranquilize the mind, suppress cough, and relieve wheezing.	Immunomodulatory, anti-tumor, antioxidant, anti-diabetic, hepatoprotective, neuroprotective, cardioprotective, anti-microbial, anti-inflammatory, anti-allergic, anti-osteoporotic, anti-angiogenic, anti-nociceptive.	
100	Shan Zhu Yu/ 山茱萸/Asiatic Cornelian Cherry Fruit	<i>Cornus officinalis</i> Sieb. et Zucc.	Cornaceae	Flesh	To tonify and nourish kidney and liver, astringe and prevent collapse.	Hypoglycemic, anti-shock, immunomodulatory, anti-inflammatory.	
101	Tian Ma/天麻/ Gastrodia Tuber	<i>Gastrodia elata</i> B1.	Orchidaceae	Tuber	To extinguish wind, arrest convulsions, pacify, repress the liver <i>yang</i> , dispel wind and unblock the collaterals.	Sedative, hypnotic, anti-convulsant, anti-epileptic, protecting and regenerating neuron, analgesic, neurodegenerative therapeutic, anti-depressive, cardioprotective, protecting brain, hepatoprotective, anti-hypertensive, anti-diabetic, platelet-aggregation-inhibitory, anti-osteoporosis, anti-inflammatory.	
102	Du Zhong Ye/杜仲叶/ Eucommia Leave	<i>Eucommia ulmoides</i> Oliv.	Eucommiaceae	Leaf	To tonify liver-kidney, strengthen sinew and bone.	Antioxidant, anti-aging, anti-mutagenic, anti-hypertensive, hypoglycemic, anti-hyperlipidemic, inhibiting CCl ₄ -induced hepatic damage and preventing gastric mucosal injury.	

Note: Entries 1-87 in the list are from the "Traditionally Used as Both Food and Medicinal Materials", which was issued in 2002. Entries 88-93 represent six new substances added in 2019, while entries 94-102 are nine additional materials included in 2023.

MFH unification with Chinese medicine for industrial growth

The distinctiveness of Chinese herbal medicinal materials arises from their dual role in agriculture and pharmaceuticals, providing a comprehensive framework for industrial progression. Grounded in the MFH philosophy, a cohesive industrial chain integrating food, health supplements, and pharmaceuticals has evolved. This chain encompasses not only the production and distribution of TCM but also the advancement of health foods and nutritional supplements. The rise in mulberry and goji berries illustrates the successful amalgamation of traditional and modern health realms. In 2022, mulberries, which are innovatively used in wellness teas, became the fastest-growing ingredient in the medicine-food market, surpassing 30 billion yuan. Goji berries have transitioned from a traditional wellness choice for the middle-aged and elderly to a popular health element among young people, with a projected consumption of 1.38 million tons and a market size of 65.3 billion yuan by 2023^[21]. These instances demonstrate the vital role of MFH materials in facilitating the integration and innovation of TCM with modern health products, showcasing their unique value and potential to drive the development of associated industries.

MFH engaging in cultural exchange for heritage enhancement

As TCM has been steadily integrated into the global healthcare system, it has emerged as a vital component of health and economic partnerships between China and various international entities, including the Association of Southeast Asian Nations, European Union, African Union, and Community of Latin American and Caribbean States. Concurrently, an increase in the number of people with suboptimal health and chronic diseases has led to a growing demand for functional health foods. In this context, MFH materials, which have valuable medicinal properties and health benefits based on TCM, are not only in high demand within China but are also gaining increasing attention internationally. According to statistics, the United States is the world's largest producer of MFH products, with the US, Europe, and Japan accounting for 90% of the global supply^[22]. Products containing ingredients such as *Astragalus*, goji berries, *Ganoderma lucidum* (Lingzhi), sea buckthorn, and turmeric are popular. For example, *Astragalus*, which is abundant in polysaccharides, flavonoids, and saponins, has been used as an immune-boosting dietary supplement. Overall, the global use of MFH materials shows special value and helps people worldwide to learn about Chinese medicinal culture.

MFH advancing in technological innovations for scientific breakthroughs

The concept of MFH has pioneered new perspectives in scientific research. In recent decades, extensive research has been conducted on the biological activity of dual-purpose materials and their metabolites. These studies have identified components such as polysaccharides, flavonoids, polyphenols, and saponins, demonstrating their vast potential in areas such as antioxidant activity, anti-aging, and prevention and treatment of

various chronic diseases^[23–25]. A notable discovery is the presence of lycibarbarspermidines in goji berries, which has been found to be effective in regulating and treating age-related neurodegenerative disorders^[26]. Similarly, astragaloside IV, a tetracyclic triterpenoid saponin recently extracted from *Astragalus*, has been shown to inhibit oxidative stress, reduce cellular apoptosis, and alleviate inflammation^[27]. Through detailed research into the components of these MFH materials and their mechanisms in treating diseases, these traditional herbs show promise not only for widespread commercial applications but also for offering broader health benefits.

Future directions toward a high-quality development of MFH

The “Food Safety Law of the People’s Republic of China” strictly prohibits the addition of drugs to food products during production and commercial operations. However, there are exceptions to materials that have dual roles as both food and traditional Chinese herbal medicines^[28]. Recently, national and local governments have been actively promoting the pilot and recognition of MFH catalogs, aiming to empower the health industry through the high-value development and utilization of MFH resources. Although these medicinal materials have been integral to traditional medicine for centuries, their safety and effectiveness as food ingredients require more comprehensive assessment.

It is essential to focus on several key areas for the high-quality advancement of the MFH concept. First, there is a need for interdisciplinary research that combines traditional medicine with modern scientific approaches, particularly in bioinformatics, pharmacology, and nutrition science^[29]. Second, sustainable and ethical practices should be prioritized to ensure the responsible use of natural resources and preservation of biodiversity. Third, establishing standardized protocols for the processing, preparation, and preservation of these products, coupled with rigorous quality control measures, is crucial for guaranteeing their safety and efficacy. Moreover, educational and cultural activities can play a significant role in integrating the MFH concept into public consciousness, thereby increasing acceptance. Formulating supportive policies and regulatory frameworks will guide the classification, labeling, and marketing of MFH products. Finally, strengthening international cooperation and exchange is vital for addressing industry challenges and promoting global development of the MFH concept.

Conflict of interest statement

The authors declare no conflict of interest.

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Author contributions

Huan Zhong and Zhi-Qing Tang drafted the manuscript. Yi-Fang Li and Mei Wang revised the manuscript. Wan-Yang Sun and Rong-Rong He proposed revisions to the important intellectual content of the manuscript. All authors reviewed and approved the manuscript.

Ethical approval of studies and informed consent

Not applicable.

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Data availability

All data generated or analyzed during this study are included in this published article.

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