外来新药用资源的传统应用与现代研究进展

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[摘要] 中药资源是中医药生存发展的物质基础,中药资源可持续发展也是我国中药现代化面临的重要课题。随着我国对中药材需求的增加,过度开发破坏了中药资源,导致我国很多天然药物资源短缺,使可持续发展陷入困境。而外来新药用资源的输入从某种程度上成为短缺中药资源的有效补充和代替,但外来新药用资源在我国的开发利用程度各异。为充分了解外来新药用资源的发展现状,该文以阿拉伯金合欢等 43 种外来新药用资源为研究对象,梳理了外来新药用资源引入形式和政策,总结外来新药用资源在原产地的应用经验和目前国内外对外来新药用资源的研究进展及所遇到的问题,分析外来新药用资源在我国的发展与研究情况,从而丰富我国药用资源及其他用途,促进中药资源的可持续利用,为外来新药用资源进一步的开发与研究提供线索。

[关键词] 外来新药用资源; 发展现状; 传统应用; 研究进展

Traditional application and modern research progress on new foreign medicinal resources

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[**Abstract**] Chinese medicinal resources are the material basis for the survival and development of traditional Chinese medicine (TCM) and the sustainable development of Chinese medicinal resources is also an important project for the modernization of TCM in China. With the increasing demand for Chinese medicinal resources in China, over-exploitation has destroyed Chinese medicinal resources, resulting in a shortage of many natural medicinal resources in China and making the sustainable development of TCM in trouble. The introduced new foreign medicinal resources have become effective supplement and replacement for Chinese medicinal resources to some extent. However, the development and utilization of new foreign medicinal resources in China are different. To fully understand the development of new foreign medicinal resources in China, this paper, taking 43 new foreign medicinal resources such as *Acacia nilotica* as objects, sorted out the introduction forms and policies of new foreign medicinal resources, overviewed its current development status in China, summarized the application experience of new foreign medicinal resources in the place of origin, as well as the research progress and problems of new foreign medicinal resources in China and abroad, and analyzed the research situation, which can

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enrich Chinese medicinal resources and other uses, promote the sustainable development of Chinese medicinal resources, and provide ideas for further development and research of new foreign medicinal resources.

[**Key words**] new foreign medicinal resources; development status; traditional application; research progress

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中药资源是自然资源的有机组成部分,是在一定空间范围内可供作为传统中药、民族药及民间草药使用的植物、动物、矿物资源蕴藏量的总和。其中,药用植物资源在种类和用量上均占到中药资源的 90%以上[1]。近年来,随着我国国民经济和中药工业的发展,国内中药、保健品等行业对中药材的需求日趋增大,过度的自然索取打破了野生中药资源的生态平衡,加上部分中药材种植基地的管理不规范以及由市场原因引起的药材价格大幅波动等因素,导致我国很多中药资源供应不稳定[2-4],如何寻找和扩大新的中药资源已经成为我国中医药可持续发展亟需解决的问题,从外来药用资源中拓展新药源是解决我国药用资源短缺问题的重要途径之一。

自古中药有外来。我国外来药物的引入和应用最早可以追溯到公元前 1 000 多年。自商周时期开始,到张骞通西域、郑和下西洋,中外交流日益隆盛,胡椒、丁香、阿魏等外来药材以商贸、朝贡等形式输入我国[5-6],《神农本草经集注》中收载了乳香、没药等,标志着外来药材正式进入我国的本草著作[7]。外来新药用资源(以下简称“外来新资源”)是指从我国疆域以外传入或从域外引种进入中国并在当地已具有悠久应用历史,无中药药性记载但有潜力成为中药的外来天然物质[8]。有研究认为其内涵包括 2 个方面:一是原产于域外,随后引种并广泛应用于我国,如乳香、胡椒、西洋参、血竭、水飞蓟等;二是我国和国外均产,但由于国外的资源应用及研究成果较显著,促使我国本土药物增加新的功效,进而得到了更加广泛的应用,如贯叶金丝桃[9]。

外来新资源的引入丰富了中药品种,扩大了我国天然药物资源,为预防和治疗疾病增加了更多的可能性。但并非所有的外来药物都能被吸收入中医药体系,而是有所选择。在外来新资源的遴选上,应坚持 4 个基本要求:①属于当地特有品种;②在当地有长期药用历史;③适应病证精准,疗效确切;④开发相对简单[10]。在原产国家和地区的传统医药文献、史料中有针对性地搜集药物的传统应用证据,归纳总结涉及传统草药的用药情况,对外来资料进行发掘和翻译,是新形势下外来新资源重要引入策略,即“三关、四步、一依托、一关键”框架下落实“情报收集关”的有效途径之一[11]。因此,本文对外来新资源的传统应用、使用现状、现代研究进展等进行全面整理,以期为外来新资源的引入、开发和利用提供参考。

1 外来新资源的引入形式与政策

1.1 外来新资源的引入形式

随着我国改革开放政策的实施及法规的完善,尤其是“一带一路”倡议的提出,为沿线各国间的传统药物资源交流提供了便利条件[11]。水飞蓟、月见草、玛咖、阿萨伊、美藤果、辣木叶、诺丽、朝鲜蓟、锯叶棕等多种天然药食资源逐渐以不同形式出现在我国市场上,主要有以下几种形式。

1.1.1 以中药材形式引入 水飞蓟在欧洲治疗肝病已有数千年历史。1952 年水飞蓟以观赏植物引入我国,1972 年从德国引种作为药用植物栽培[12]。1998 年纳入《北京市中药材标准》,2005 年载入《中国药典》,性味归经为苦,凉,归肝、胆经;功能主治为清热解毒、疏肝利胆,用于肝胆湿热,胁痛,黄疸[9]。因有明确的中药药性为依据,目前已有 13 种含水飞蓟的中成药品种上市[13]。水飞蓟被《中国药典》收载,赋予了中药药性,形成了明确的中医临床标准,成为当代引入外来新资源的典范。

1.1.2 以保健食品原料形式引入 月见草原产于南美洲,具有显著的降脂、抗炎作用,月见草油以化学药标准纳入《中国药典》(2000 年版二部),月见草子作为月见草油的原料药纳入《辽宁省中药材标准》(2009 年版),其尚未有性味归经、功能主治等中医表述内容。目前已有 15 种以月见草油为原料的国产保健食品。有“南美人参”之誉的玛咖具有增强免疫力、缓解体力疲劳等作用,但目前仅有食品标准,在我国可作为保健食品原料使用,与人参、西洋参、枸杞等配伍的国产保健食品已有 96 种[13]。上述 2 种外来新资源已依法引入我国并进行栽培,且有与中药配伍的多种保健食品上市销售,但因其尚未获得明确的中药药性及中医临床标准,其配伍应用仍缺乏充分的中医药理论支撑。

1.1.3 以新食品原料形式引入 自 2007 年卫生部颁布的《食品新资源卫生管理办法》到 2013 年国家卫生和计划生育委员会正式公布《新食品原料安全性审查管理办法》实施以来,作为新资源食品或新食品原料引入的有阿萨伊、美藤果、辣木叶、诺丽、玛咖等[6]。以新食品原料形式引入,使此类外来新资源在我国的应用与产品开发合法化。

1.1.4 以进口天然药物形式引入 我国已批准进口多个国外天然药物制剂,从德国进口的锯叶棕果实提取物软胶囊(注册证号 Z20170002),主要用于良性前列腺增生患者,治疗尿频、尿急、排尿困难等。从日本进口的外用药复方山金车花贴片(国药准字 J20060002),主要作用为消炎止痛,局部降温,适用于跌打扭伤、骨折痛、肩周炎、腰背肌肉痛、冻疮等[13]。国外天然药物制剂的进口和使用为引入外来新资源提供了可能。

1.1.5 以普通食品形式引入 朝鲜蓟先以蔬菜引入和使用,随后被《新华本草纲要》(1991 年版)、《中华本草》(1999

年版)、《中药大辞典》(1977 年版)等收载。目前国内已有朝鲜蓟提取物的保健食品 3 种,功能为辅助降血脂和保护化学性肝损伤[13]。

1.2 我国引入外来新资源的相关政策

引入外来新资源的核心目的是开发和利用。外来新资源的引入均应参照我国相应法律法规的要求而区别处置。

以中药材形式引入的,如引进的外来新资源已是我国认定的中药材,应符合我国《进口药材管理办法》(2019 年版)[14]对首次进口药材和非首次进口药材规定:首次进口药材,是指非同一国家(地区)、非同一申请人、非同一药材基原的进口药材,需要先取得进口药材批件后向口岸药品监督管理部门备案;列入《非首次进口药材品种目录》(2006 年版、2011 年版)的品种,以及尚未列入目录,但申请人、药材基原及国家(地区)均未发生变更的,按照非首次进口药材管理,可直接进行备案。如引进的外来新资源尚未成为我国认定的中药材,则应参照《中药注册分类及申报资料要求》(2020 年第 68 号)对新药材及其制剂做中药创新药的申报注册。

以保健品原料形式引入的,应符合《保健食品原料目录与保健功能目录管理办法》(2019 年版)对纳入保健食品原料目录的要求:具有国内外食用历史、原料安全性确切、在批准注册的保健食品中已经使用,原料对应的功效已经纳入现行的保健功能目录,原料及其用量范围、对应的功效、生产工艺、检测方法等产品技术要求可以实现标准化管理,确保依据目录备案的产品质量一致性。

以新食品原料形式引入的,应符合 2013 年实施的《新食品原料安全性审查管理办法》规定:新食品原料包括了动物、植物和微生物,从动物、植物和微生物中分离的成分,原有结构发生改变的食品成分,其他新研制的食品原料[15]。

以普通食品形式引入的,根据《中华人民共和国食品安全法》(2021 年修正版)规定,进口食品应当符合我国食品安全国家标准;进口尚无食品安全国家标准的食品,由境外出口商、境外生产企业或者其委托的进口商向国务院卫生行政部门提交所执行的相关国家(地区)标准或者国际标准。

以进口天然药物形式引入的,应符合 2004 年颁布执行的《药品进口管理办法》规定:药品必须经由国务院批准的允许药品进口的口岸进口,进口药品必须取得国家食品药品监督管理局核发的《进口药品注册证》(或《医药产品注册证》)或《进口药品批件》,方可办理进口备案和口岸检验手续。

2 外来新资源引入我国后的发展现状

从汉代丝绸之路开辟以来就有外来新资源以不同的形式引入,其中一部分在临床实践中成为了中药并沿用至今;另一部分应用于食品、化妆品、保健品等领域。目前对于外来新资源的研究和引入日益受到关注,但部分外来新资源在引入过程中也出现了较多争议和问题。比如,玛咖在秘鲁的食用历史悠久[16],作为植物药或功能食品在全球范围内普遍应用,自引种后在我国云南、贵州等地广泛种植,与多种同中药配伍也在临床使用。但玛咖的热潮也导致了一些问题[17]:某些功能在过度炒作下出现,并没有确切的体内研究和临床试验证据;在市场高需求和高利润驱动下,国内大规模种植和进口,对供应、产品质量和安全构成严重威胁。因此,应充分汲取玛咖产业发展的经验和教训,在开发和利用外来新资源时,做好新资源在原产地的情报收集调研,并针对我国医疗健康实际需求评估外来新资源引入我国后的发展前景,切实有助于外来新资源在我国获得更好的应用。

据统计,近现代有 40 余种外来新资源以新资源食品、保健食品、化妆品原料等多种形式进入我国[6],本文通过文献查证了它们在国内发展现状(表 1)。其中,有 27 种新资源的原植物已在我国实现了引种栽培/种植;成为新资源食品的有 5 种,如阿萨伊、美藤果等;12 种开发成保健类产品,如朝鲜蓟、明日叶、奇亚籽等;还有 4 种外来新资源发展现状暂不清楚。

3 外来新资源的传统应用

自古以来,植物就被用作传统医药的重要组成部分,承载于植物上的传统医药知识在医疗实践和药物发现上发挥着关键作用[75]。民族植物学(ethnobotany)是记录植物传统应用知识的重要手段,特别是对于历史不清晰的传统药用植物,它可以为进一步研究提供相关数据[76]。许多国家的传统植物知识都是通过民族植物学研究被发现、整理和保存的[77]。

外来新资源分布于世界各地且应用历史悠久。如粉色西番莲的地上部分,包括叶子、花和果实,在欧洲、亚洲和非洲传统医学中适用于各种症状的使用,在欧洲主要用于镇静和癫痫;在亚洲和非洲主要用于镇静、失眠、焦虑、痉挛等[34]。然而,由于地域性及民族文化差异,这些新资源药材的传统应用在不同地域可能有所不同。本文对它们的民族植物学文献进行全面调研,整理其传统应用等信息(表 2),并记录其在原产地的适应症和应用情况。

4 外来新资源的现代研究进展

外来新资源在国外传统医学中长期应用或者人群长期食用,具有康复与医疗保健作用,目前已经引起我国学者关注进行研究,但我国对外来新资源的开发尚且不足,而外来新资源在原产国的研究则相对更广泛和深入[215]。为充分了解外来新资源在国内外的研究进展,本文通过梳理其现代研究文献,总结和分析外来新资源的化学成分、生物活性(表 3),反映外来新资源当前的研究水平和程度,以便促进有药食价值的外来新资源在我国更好地开发和应用。

利用医学主题词表(medical subject headings, MeSH),以外来新资源生物活性为基础,通过对药理作用进行分类和统计(图 1),发现当前引入我国的多数外来新资源具有抗炎、抗氧化、抗癌及抗感染作用,其次是镇痛和抗抑郁等神经保护活性,其他生物活性包括免疫调节、心血管保护、抗过敏、利尿、抗凝血、降血脂、抗风湿等。由此可知,目前对外来新

表 1 外来新资源引入我国后的发展现状

Table 1 Development status of new foreign medicinal resources after introduction into China

基原	中文名	科	原产地	我国发展现状	参考文献
Acacia nilotica	阿拉伯金合欢	豆科	非洲(苏丹中北部、埃及、尼日利亚);亚洲(阿拉伯、孟加拉国、巴基斯坦);大洋洲(澳大利亚)	引种栽培;化妆品原料	[18-21]
Ammi visnaga	阿米芹	伞形科	非洲(北非埃及、摩洛哥);亚洲(伊朗);欧洲地中海地区	引种栽培	[22-23]
Euterpe oleracea	阿萨伊	棕榈科	南美洲(巴西、秘鲁、亚马孙河三角洲、哥伦比亚、苏里南)	引种栽培;新资源食品	[24-27]
Cynara scolymus	朝鲜蓟	菊科	欧洲(意大利、法国);北美洲(美国南部);南美洲(巴西);地中海地区	引种栽培;保健蔬菜、药品原料	[28-29]
Matricaria chamomilla	德国洋甘菊	菊科	南美洲(安第斯山脉);欧洲;亚洲	引种栽培	[30-31]
Eurycoma longifolia	东革阿里	苦木科	亚洲(马来西亚、印度、越南、柬埔寨、缅甸、老挝、泰国)	引种栽培;保健饮品、药品原料	[32-33]
Passiflora incarnata	粉色西番莲	西番莲科	欧洲(土耳其、西班牙);北美洲(墨西哥);中美洲;南美洲(阿根廷、巴西)	引种栽培;化妆品原料	[34]
Hebanthe eriantha	珐菲亚参	苋科	地中海地区;南美洲(巴西、热带雨林地区);中美洲(巴拿马)	引种栽培;保健产品原料	-
Ribes nigrum	黑穗醋栗	虎耳草科	欧洲(北欧、英国);亚洲	引种栽培;保健食品、药物原料	[35-38]
Primula veris	黄花九轮草	报春花科	欧洲;西亚的温带地区	化妆品原料	[37]
Abelmoschus esculentus	黄秋葵	锦葵科	东南亚、非洲等热带和亚热带地区	引入栽培;保健蔬菜	[38]
Calendula officinalis	金盏花	菊科	南欧;地中海地区	引入栽培;药品原料、化妆品原料、药食同源	[39]
Serenoa repens	锯叶棕	棕榈科	北美洲(美国)	进口;药品原料、化妆品原料	[40]
Piper methysticum	卡瓦胡椒	胡椒科	南太平洋群岛(美拉尼西亚、波利尼西亚、密克罗尼西亚)	引种栽培;化妆品原料	[41]
Moringa oleifera	辣木叶	辣木科	亚洲(印度、马来西亚、阿富汗、孟加拉国、巴基斯坦)	引种栽培;新资源食品、药品原料、化妆品原料	[42]
Anthemis nobilis	罗马洋甘菊	菊科	欧洲(英国、保加利亚);北非;西南亚	引种栽培	-
Lepidium meyenii	玛咖	十字花科	南美洲(安第斯山地区、秘鲁、阿根廷)	引种栽培;新资源食品、保健食品、食品	[43]
Vaccinium macrocarpon	蔓越莓	杜鹃花科	北美洲(美国、加拿大)	引种栽培;保健饮料	[44]
Plukenetia volubilis	美藤果	大戟科	南美洲(秘鲁、厄瓜多尔、巴西、亚马逊地区、玻利维亚、安的列斯群岛)	引种栽培;新资源食品、化妆品原料	[45]
Angelica keiskei	明日叶	伞形科	亚洲(日本、韩国)	引种栽培;新食品原料、保健产品、食品	[46]
Harpagophytum procumbens	南非钩麻	胡麻科	非洲南部喀拉哈里地区	化妆品原料	[47]
Withania somnifera	南非醉茄	茄科	亚洲(印度);非洲(南非);地中海地区	不详	[48]
Morinda citrifolia	诺丽	茜草科	波利尼西亚;东南亚	引种栽培;新资源食品、保健食品	[49-50]
Aesculus hippocastanum	欧洲七叶树种子	七叶树科	欧洲(阿尔巴尼亚、巴尔干半岛、高加索);非洲	引种栽培	[51]
Vaccinium myrtillus	欧洲越橘	杜鹃花科	欧洲(俄罗斯);北非;北美洲(加拿大)	药品原料、保健食品的原料	[52-53]
Salvia hispanica	奇亚籽	唇形科	北美洲(墨西哥南部、危地马拉)	进口;新食品原料、功能食品、保健饮料	[54]
Uncaria tomentosa	绒毛钩藤	茜草科	中美洲;南美洲(亚马逊地区、巴西)	化妆品原料	[55-56]
Arnica montana	山金车	菊科	欧洲;亚洲北部(西伯利亚);美洲	药品原料、化妆品原料	[57]
Silybum marianum	水飞蓟	菊科	欧洲(俄罗斯南部)、非洲(埃及);亚洲(小亚细亚);大洋洲(澳大利亚);地中海地区	引种栽培;新食品原料、药品原料、化妆品原料、保健食品、进入中成药处方	[58-59]
Vitex agnus-castus	穗花牡荆	马鞭草科	地中海地区;欧洲;中亚	引种栽培;药品原料、化妆品原料	[60]
Cephaelis ipecacuanha	吐根	茜草科	中美洲;南美洲(巴西西南部的亚马孙河流域等)	引种栽培;进入中成药处方、药品原料	[61]

续表1

基原	中文名	科	原产地	我国发展现状	参考文献
Aspalathus linearis	线叶金雀花	豆科	南非(开普敦地区)	新食品原料	-
Melissa officinalis	香蜂花	唇形科	欧洲;亚洲(中亚、西亚伊朗);地中海地区;大西洋沿岸	引种栽培;化妆品原料、食疗蔬菜	[62]
Kaempferia parviflora	小花山柰	姜科	亚洲(马来西亚、苏门答腊岛、婆罗洲岛、泰国等热带地区)	引种栽培	[63]
Plantago psyllium	洋车前子	车前草科	亚洲(伊朗、印度);地中海地区	不详	[64]
Matricaria recutita	洋甘菊	菊科	欧洲东南部(希腊、罗马);西亚	引种栽培;进入中成药处方、药品原料、化妆品原料	[65-66]
Symphytum officinale	药用聚合草	紫草科	俄罗斯西部及高加索、西伯利亚地区;北美洲	引种栽培;化妆品原料、畜禽饲料	[67]
Corynanthe johimbe	育亨宾	茜草科	非洲(尼日利亚西南部、加蓬、刚果、喀麦隆、赤道几内亚)	药品原料	[68-69]
Oenothera erythrosepala	月见草	柳叶菜科	北美洲(加拿大、美国);南美洲	引种栽培;进入中成药处方、药品原料、化妆品原料	[70]
Malpighia glabra	针叶樱桃	金虎尾科	安的列斯群岛;中美洲、南美洲北部	引种栽培;保健食品、化妆品原料	[71]
Medicago sativa	紫花苜蓿	豆科	亚洲(亚美尼亚、伊朗、阿塞拜疆、印度);北美洲(美国);欧洲(土耳其);部分中东国家	不详	[72]
Echinacea purpurea	紫锥菊	菊科	北美洲中南部(加拿大、美国)	保健食品、药品原料、畜禽饲料、一类新兽药	[73]
Cimicifuga romose	总状升麻	毛茛科	北美洲(加拿大、美国东部);欧洲	不详	[74]

表2 外来新资源的当地用途与应用

Table 2 Local uses and applications of new foreign medicinal resources

基原	用药部位	当地用途	研发产品	有记载的药典
Acacia nilotica	叶[78];树皮、豆荚[79-80];果实、茎皮[18];木材[81];种子[19];根、花[82];树胶[83]	肿瘤(耳部、眼部、皮肤),胃肠道疾病(腹泻、胆囊问题、痢疾),牙痛[79],感冒发烧,咳嗽,支气管炎,肺炎[18],腹痛,生殖器和尿路感染[84],麻风病,天花[81],结核病[19],眼炎,月经问题,糖尿病,痔疮,硬化症[78],兴奋剂,解毒剂;外用(溃疡、烧伤、割伤、疥疮、毒咬伤)[82]	膳食补充剂[85],膳食调味剂(种子)[19],哺乳期营养品(树胶)[83],牙膏和洗发水[82]	《印度药典》(2010年版)
Ammi visnaga	花朵、伞形花序[86];成熟果实[23];种子[87]	尿石症(肾结石、尿路结石、肾脏炎症),前列腺痛[88-89],呼吸道疾病(支气管炎、哮喘、咳嗽),心绞痛[87],龋齿,牙龈炎,牙脓肿,牙疼,牙龈出血,口臭[86],高甘油三酯血症,白癜风,眩晕,头痛[22],月经痛,经前综合征,腹绞痛,低血糖,牛皮癣[23]	茶制剂[23],含漱剂[86],碎石剂[22]	-
Euterpe oleracea	浆果果肉、提取物[90];果实[91-92];果汁混合物[93]	发烧,疼痛,炎症,贫血[92],强直-阵挛性癫痫发作[94],神经保护和胃黏膜、心脏保护作用[25,95]	功能性食品[94],营养补充剂,能量饮料[25],浓缩果汁,食物[93]	-
Cynara scolymus	叶[28];花蕾[95];头状花序、花托和苞片[96];茎[97]	坏血病,贫血,胆道疾病,消化不良,动脉粥样硬化[28]	功能性食品[98],凉茶[28],作为饮料、化妆品、茶产品和食品的添加剂[95],食用蔬菜[96]	《欧洲药典》
Matricaria chamomilla	全株[99];头状花序[100]	胃肠道疾病(胃痛、痢疾、腹泻、腹痛、胀气、便秘、肠绞痛、消化不良),呼吸道疾病(鼻窦炎、咽炎、喉咙痛、支气管炎、咳嗽),生殖器和尿路感染,尿石症,结膜炎,发热,皮肤溃疡,皮肤感染[99],各种疼痛(头痛、牙痛、耳痛)[101],口腔和皮肤伤口[102],经前综合征,膝骨关节炎,失眠[31]	烘焙食品,糖果,酒精饮料[100],草药茶,咳嗽糖浆,化妆品(乳膏,软膏,肥皂,洗涤剂,香水,乳液,软膏,护发制品)[103],食品防腐剂[99]	《美国药典》《英国药典》

续表2

基原	用药部位	当地用途	研发产品	有记载的药典
Eurycoma longifolia	根、叶[32]；叶、果实、树皮、直根、根皮[33]	壮阳，性功能障碍，增加能量，疲劳，溃疡，持续发烧，腺体肿胀，牙龈疾病，性疾病（梅毒、淋病）[32]，便秘，消化不良，腹泻，痢疾，间歇性发热，疟疾，衰老，骨质疏松，肿瘤，恶病质，焦虑，腰痛，黄疸，水肿，瘙痒，糖尿病，白血病，高血压病[33]	食欲兴奋剂，健康补充剂，壮阳药[33]，人参的替代品，与咖啡（和人参）混合的添加剂，茶（根），驱虫剂[32]	-
Passiflora incarnata	果汁、果皮、种子	神经疾病（焦虑、神经衰弱、轻度精神压力、注意缺陷多动障碍、歇斯底里症、癫痫、轻度睡眠障碍、神经痛、镇静镇痛、麻醉），肌肉痉挛，腹泻，便秘，消化不良，腹部痉挛，痔疮，百日咳，哮喘，糖尿病，烧伤，痛经，经前综合征，抗炎，高血压病，哮喘，驱虫[34]	天然食品补充剂[34]	《美国药典》《英国药典》《欧洲药典》
Hebanthe eriantha	全株	壮阳，提神，减轻压力，改善记忆力，镇痛[104]，糖尿病，肿瘤[105]，风湿病[106]	滋补品，壮阳药[106]，人参的替代品[107]	《巴西药典》
Ribes nigrum	浆果、果皮[36]	眼睛疲劳[108]，风湿性疾病，血管舒张，高血压病，糖尿病神经病变，肿瘤，神经退行性疾病，痉挛，抗凝[109]，皮肤改善，减轻脱发[110]	食用果酱[111]，果汁甜酒[36]，天然着色剂[109]	-
Primula veris	花、根[37]	支气管黏膜炎，百日咳，哮喘，感冒，流感[37]，偏头痛，失眠，神经应激，中风和出血后的恢复，月经疾病，利尿[112]	膳食补充剂，花草茶[37]，食品添加剂，治疗呼吸系统疾病的糖浆制剂[112]	《欧洲药典》《法国药典》
Abelmoschus esculentus	豆荚[38]；种子[113]；整株[114]	胃炎，胃溃疡，结肠炎，黄疸，腹泻，胃和肠刺激[113,115]，淋病，排尿困难，支气管炎，肺炎，卡他菌感染，肝炎，牙科疾病，急性炎症[114]，糖尿病[116]	食品（蔬菜、汤、沙拉）[114]，食品添加剂[117]，脂肪替代品[116]	-
Calendula officinalis	花、叶	净化血液，静脉曲张[118]，伤口愈合不良，轻微烧伤，瘀伤，疤痕[119]，肾结石，利尿，镇静，解热，头痛，痉挛，胆结石，痔疮，十二指肠溃疡，黄疸，疱疹，麻疹，天花，皮疹，肿瘤，发汗，视力不佳，月经不调，红眼病，水肿[39]	乳膏，软膏，护肤和护发产品，消毒剂[118]	《欧洲药典》
Serenoa repens	果实[120-121]	镇静，助眠，祛痰，止咳，哺乳问题，不孕症，消化不良，胃痛，腹泻，泌尿系统问题（排尿困难）[120]，睾丸萎缩，勃起功能障碍，前列腺肿胀，炎症[121]	食物，草药茶[120]	《欧洲药典》《美国药典》《英国药典》《马丁代尔大药典》
Piper methysticum	根、茎、叶[122]	诱导放松和睡眠，安神，抗疲劳，镇痛，镇静，焦虑，舒缓神经，牙周炎，类风湿性关节炎[123]，预防癌症[122]	膳食补充剂，饮料[123]	《植物药典》《美国药典》
Moringa oleifera	树皮、叶、种子、花、根、豆荚、树胶、果实	月经疼痛，白带，生育问题，壮阳，抗疲劳，前列腺问题，流产，黄疸，便秘，腹泻，糖尿病，高脂血症，降血压，甲状腺疾病[124]，其他皮肤感染，发烧，哮喘，咳嗽，溃疡，伤口愈合[125]，腹部和皮肤肿瘤，神经疾病，癫痫，歇斯底里症，麻痹，坏血病眼睛疼痛，脾肿大，肠蠕虫[126]	食用蔬菜，功能食品（保健颗粒和茶）护发产品，凝结剂，驱虫剂，生物燃料，杀虫剂，清洁剂，饲料[42]	《印度阿育吠陀药典》
Anthemis nobilis	花[127]	糖尿病[128]，流感，风湿性疼痛，肌肉痉挛，焦虑，抽搐，失眠，胃肠道疾病，痔疮，黏膜溃疡[129]，皮肤炎症，月经失调，伤口愈合[130]	天然调味剂，香料成分（酒精饮料、糖果、糕点），皮肤调理剂（香水、化妆品）[129]，茶，药膏，兽药和饲料[127]	-
Lepidium meyenii	根[43]；下胚轴、块茎[131]	增加生育能力[43]，阳痿，调节人体新陈代谢和荷尔蒙分泌，女性激素失衡[132]，疲劳，更年期症状，勃起功能障碍，良性前列腺增生[17]，降血压，抑郁症，焦虑症，记忆力受损，风湿病，呼吸系统疾病，泻药，贫血症，骨质疏松症[131]	膳食补充剂[43]，饮料[17]	-
Vaccinium macrocarpon	浆果	尿路感染，肿瘤[133]，伤口，坏血病，幽门螺杆菌感染，通便，预防心血管疾病，血糖控制[134]，口腔龋齿[135]	功能食品，膳食补充剂[134]，鸡尾酒汁饮料，布染料	-

续表2

基原	用药部位	当地用途	研发产品	有记载的药典
Plukenetia volubilis	种子、叶、壳[45]	心血管疾病(冠心病、高血压病、高胆固醇血症)[136],慢性炎症疾病,风湿和类风湿关节炎[45],炎症性皮肤病,改善消化,认知障碍,美容,肌肉疼痛,肿瘤,糖尿病[137]	食物,营养替代品,膳食补充剂[45]	-
Angelica keiskei	叶、花[46];茎、根[138]	预防血栓性疾病,高血压病,高脂血症,月经异常,女性生殖健康疾病[139],利尿,泻药,补药,兴奋剂[46],贫血,糖尿病,衰老,肿瘤[140],感染[141],哮喘,慢性肝炎,胃炎,肥胖,牛皮癣,肌肉和关节疼痛[142],骨质疏松症,预防代谢综合征[143]	蔬菜(地上部位),饮料,膳食补充剂[143],茶,食品添加剂,保健品[144]和药物(根)[138],化妆品[46]	-
Harpagophytum procumbens	根、块茎[47]	消化不良,胃痛,便秘,腹泻,胃溃疡,风湿关节炎,肌腱炎,肌肉和关节疼痛,梅毒,淋病,促分娩,分娩产后疼痛,痛经,感冒发烧,咳嗽,肺结核,哮喘,消化不良,食欲不振,尿路感染,肾脏炎症,糖尿病,心脏病,血液疾病,疖子,扭伤[47]	食欲兴奋剂,烧伤愈合软膏,在欧洲被制成保健品如茶、片剂、胶囊、外用凝胶和贴剂[47]	-
Withania somnifera	根、叶、果实、种子[145];全株[146]	中枢神经系统疾病[帕金森病、癫痫、阿尔茨海默病、益智、失眠、截瘫、大腿肌肉慢性僵硬、认知缺陷、失眠、焦虑、神经崩溃、健忘症、睡眠障碍、药物成瘾(阿片类药物成瘾)、神经症],尿失禁,支气管炎,哮喘,肺结核[48],癌症(结肠癌、乳腺癌、肺癌、前列腺癌、皮肤癌、血液癌、肝癌、肾癌)[145],免疫调节,淋巴结炎,风湿病,其他炎症性疾病,类风湿性关节炎,痛风,多关节炎,白带病,妇科疾病,不孕不育,性功能障碍,遗精,腰痛[147],皮肤病,疥疮,丹毒,疖子,疼痛肿胀[148],传染病,梅毒,胃肠道疾病,便秘,溃疡,过度消瘦,水肿,心脏病,腹部疾病,外伤[149]	膳食补充剂,减压按摩油,糖浆和胶囊[146]	《印度药典》(2010年版)
Morinda citrifolia	根、叶、果实、全株[49];根皮、种子、茎、花[150]	心血管疾病(心脏病、高血压病、动脉硬化、血管问题),药物成瘾,肌肉疼痛,中枢神经系统疾病(焦虑、癫痫、阿尔茨海默病、精神病、头痛、精神抑郁),衰老,毒瘾[151],月经困难和痉挛,胃溃疡,消化不良,感冒[49],癌症及相关疼痛,恶心,呕吐,肌肉酸痛,扭伤,烧伤,关节炎,糖尿病,艾滋病[150]	食品补充剂,果汁饮料[151]	-
Aesculus hippocastanum	叶、树皮、未成熟果皮[152]	脑外伤,中风,静脉充血,血栓性静脉炎,静脉曲张,血肿,心脏功能不全,疼痛,下肢肿胀,静脉炎,烧伤,表皮磨损,冻伤,肠胃胀气,厌食,胃溃疡,腹泻,耳鼻和咽喉感染,皮肤炎症,糖尿病肾病,发热,前列腺肿大,痔疮[152]	非食用淀粉[152],饮料中的泡沫稳定剂[153]	《美国药典》
Vaccinium myrtillus	果实[52]	肿瘤,心血管疾病,糖尿病,尿路感染,牙周病[52],大脑衰老,神经退行性疾病,肥胖,炎症[53]	果酱果汁,葡萄酒或利口酒[52]	-
Salvia hispanica	种子、芽[54];树枝、叶、根[154]	心血管疾病(血脂异常、高血压病),抗凝血、抑郁、焦虑,镇痛,炎症,泻药,改善视力和免疫[54],呼吸道感染,肥胖,糖尿病,肿瘤[154]	食品添加剂[154],食品(谷物棒、饼干、面包)[155],营养补充剂:沙拉(芽)、饮料和谷物食品(籽)[54]	-
Uncaria tomentosa	叶、树皮[55];根[156]	哮喘,癌症,风湿病,关节炎,脓肿,过敏,感染,骨关节炎[157,55],退行性疾病[56],发烧,胃溃疡,出血,经前综合征[158],月经不调,避孕,产后恢复,尿路炎症,病毒感染,外伤[156]	不详	-
Arnica montana	花、叶、全株、种子、根[57]	外伤(挫伤、割伤、皮肤瘀伤[159]),风湿病,炎症,骨关节炎,脱发,慢性静脉功能不全,肌肉痉挛,酸痛和疼痛,咳嗽,血肿,头痛[57]	乳膏,软膏,凝胶,湿膏剂,糖浆,酊剂[57]	《欧洲药典》

续表2

基原	用药部位	当地用途	研发产品	有记载的药典
Silybum marianum	果实、种子[58]；根、树皮、叶、未成熟的果实、花、茎[160]	肝脏疾病(肝硬化、肝炎、慢性炎症性肝病、黄疸)[161]，胆囊疾病，胆结石[162]，肿瘤，解毒(生物毒素如霉菌毒素、蛇毒、细菌毒素或化学毒性药物如金属、农药、心脏毒性、神经毒性、肝毒性和肾毒性药物)，炎症[59]，肾病，不孕症，性无能，胃肠道疾病(肠胃炎、腹泻和痢疾、胃反流)，抑郁症，偏头痛，全身镇痛，精神障碍，焦虑，神经紧张，儿童食物中毒，发汗，地中海贫血，心脏疾病，乳腺癌[160]，肿胀，丹毒，经痛，痔疮疼痛，风湿病，发烧[163]	草药膳食补充剂，茶(植物的汁液与蜂蜜混合)[163]	《美国药典》《欧洲药典》
Vitex agnus-castus	叶、嫩茎、花、成熟的种子果实[60]；全株[164]	经前综合征，乳腺痛，异常子宫出血疾病，乳房突痛[165]，月经紊乱(闭经、痛经)，经前焦虑障碍(PMDD)，黄体功能不全，高催乳素血症，不孕症，更年期综合征，绝经，泌乳中断，周期性乳房疼痛，产褥期出血症状[166]，腹泻，胀气[60]，脾脏损伤，肿胀，炎症，性功能障碍，疼痛，痤疮[164]	药丸和胶囊[60]	《欧洲药典》
Cephaelis ipecacuanha	根[167]；根茎[168]	祛痰，杀虫[167]，中毒或药物过量后的催吐药[168]	不详	《欧洲药典》《印度药典》《日本药典》《美国药典》《韩国药典》《巴西药典》
Aspalathus linearis	叶[169]；茎	代谢综合征，减少慢性炎症，降低患神经退行性疾病风险[169]，缓解神经紧张[170]，皮肤病，过敏，哮喘，胃肠疾病；烧心、恶心、各种消化问题[171]	护肤品的添加剂[172]，健康饮料，凉茶[169]	-
Melissa officinalis	叶[62]；根[173]	中枢神经系统疾病(痴呆、癫痫、瘫痪、中风、震颤、偏头痛、眩晕，噩梦、焦虑、抑郁、失眠、神经质、精神病、歇斯底里症、解痉、镇静、镇痛、增强记忆)[173]，心脏疾病(心悸、降血压、心律失常、心力衰竭)，哮喘，支气管炎，喉咙痛，咳嗽，溃疡，功能性胃肠道疾病，胀气，消化不良，绞痛，肠溃疡，痢疾，牙痛[62]，结膜炎，视力丧失，肝脏和胆道疾病，瘰疬肿瘤和其他肿胀，止血，耳痛，秃头，闭经，关节痛，疲惫，贫血，利尿，糖尿病，退烧，中毒引起的窒息[174]	食品添加剂和芳香疗法[173]，茶，膏药(盐和香蜂花叶)[174]	《欧洲药典》
Kaempferia parviflora	根茎[63]	降血糖[175]，阳痿，疲劳，痛风，身体疼痛，骨质疏松[176]，脓肿，过敏，骨关节炎[177]，胃肠道疾病(食欲不振、胃痛、泻药、消化性溃疡)[178-179]，促长寿[180]	膳食补充剂[181]	-
Plantago psyllium	种子[182]	高血糖，降脂[64]，镇痛，慢性便秘[183-184]，呼吸系统，胃肠系统，泌尿系统(排尿困难)[185]，肌肉骨骼系统，生殖系统和皮肤疾病[186]	药剂辅料(种子)[182]，膳食纤维的来源[184]	《欧洲药典》
Matricaria recutita	花、头状花序	皮肤病(皮肤和黏膜炎症、皮肤刺激红肿)[187,65]，抑郁，焦虑，神经痛，腕管综合征，解痉[66]，遗尿，经前期综合征，多囊卵巢综合征[188]，消化系统疾病(腹泻、肠易激综合征、消化性溃疡、胃肠道痉挛)[189]，风湿痛，骨关节炎，伤口，外用[皮肤黏膜和肛门生殖器部位炎症、细菌性皮肤病(口腔和牙龈疾病)]，呼吸道炎症[190]	肥皂，洗涤剂，香水，乳液，软膏，护发制品和局部外用制剂[65]，烘焙食品，糖果，酒精饮料，草药茶，漱口水[190]	《欧洲药典》
Symphytum officinale	根[191]	支气管炎，肺结核，腹泻，溃疡，痔疮[67]，肌肉疼痛[192]，急性背部疼痛，伤口(瘀伤、拉伤、扭伤、钝性损伤)，促骨折愈合，肌腱炎，非活动性膝关节病，炎症，乳腺炎，皮肤炎，关节炎[191]，昆虫叮咬，血肿[193]	不详	-
Corynanthe johimbe	树皮[68]；茎皮	壮阳[68]，发烧，麻风病，咳嗽[194]，性功能障碍[195]，抑郁，焦虑症[196]，兴奋剂，致幻剂，降血压，胸痛，疲惫，局部止痛[69]	膳食补充剂[195]，家禽饲料[68]	《欧洲药典》《美国药典》

续表2

基原	用药部位	当地用途	研发产品	有记载的药典
Oenothera erythrosepala	叶、茎、种子[70];花[197];芽[198]	高脂血症,动脉粥样硬化,高血压病,冠心病,心肌梗死,内皮功能障碍,胃肠道疾病(消化性溃疡、溃疡性结肠炎、克罗恩病、炎症性肠病),龋齿,神经退行性疾病,多发性硬化症,精神分裂症[199],子宫内膜异位症,乳腺痛,经前综合征,特应性皮炎,湿疹,风湿病,炎症,皮疹,痤疮,风湿性关节炎,干燥综合征[200],哮喘[201],干咳,肥胖症,儿童多动症,糖尿病性神经病变,酗酒,肾病,细菌真菌病毒感染,疲劳,类风湿性关节炎,肿瘤[202]	营养和药物补充剂[200],食用蔬菜[198]	《欧洲药典》《美国药典》
Malpighia glabra	果实[203]	腹泻,痢疾里急后重,兴奋食欲,炎症,利尿,发烧,伤口愈合,高胆固醇,贫血,糖尿病,风湿病,肝病,肺结核,乳腺病,肝炎[203],预防高血压病、癌症、病毒性肝炎、水痘、脊髓灰质炎、流感、感冒、肺部疾病、肝功能衰竭和胆囊不规则[71]	食品补充剂,茶饮料,花蜜,果汁,白酒,冰淇淋,护肤用品[203],口香糖,营养食品,补充维生素C,营养棒和酸奶[71]	-
Medicago sativa	种子[72];茎[204];叶[205]	免疫调节,肿瘤[72],高血压病,代谢紊乱,关节炎,肾脏问题,降低胆固醇[205]	动物饲料[72]	
Echinacea purpurea	花、根[73];果实[206];芽[207];叶[208]	呼吸系统疾病(感冒、咳嗽、支气管炎、肺部感染),咽部炎症,口腔和喉痛,牙痛[209],偏头痛,焦虑,胸部疾病,鹅口疮,慢性免疫缺陷疾病[207],病毒感染[208],传染性疾病[210],皮肤炎症,外伤,解毒剂[211],胃痉挛[206]	膳食补充剂[73],药丸,软膏和茶[207],糖浆[208],鱼饲料(花根)	《美国药典》
Cimicifuga romose	根、根茎[212]	更年期综合征(出汗、失眠、情绪变化、头痛、阴道干燥、潮热)[74],消炎[213],镇痛(头痛、牙痛、痛经),感冒,发热性咽喉痛,咳嗽,风湿病[214],消化不良,驱虫剂,解毒剂[212];外用(响尾蛇咬伤)	草药膳食补充剂[212]	《欧洲药典》《美国药典》《英国药典》

注:-.无记载(表3同)。

表3 外来新资源的现代研究概况

Table 3 Overview of modern research on new foreign medicinal resources

基原	成分	生物活性	参考文献
Acacia nilotica	皂苷、黄酮类、植物甾醇、酚类	抗疟、抗寄生虫、抗氧化、抑制特应性皮炎瘙痒、抗炎、抗癌、免疫调节、降低肝毒性、抗白蚁	[20,78-79,82,85]
Ammi visnaga	酚类、黄酮类、γ-吡喃酮、甾醇、精油、脂肪酸	抗癌、抗过敏、抗动脉粥样硬化、镇痛、降血糖、抗菌、抗氧化、抗突变、松弛平滑肌、免疫调节、杀虫、伤口愈合、炎症	[22,87,216-217]
Euterpe oleracea	黄酮类、花青素、多酚类	抗氧化、神经和心脏保护作用、抗炎、抗衰老、镇痛	[24,92-94,218]
Cynara scolymus	酚类、维生素	抗动脉粥样硬化作用、抗炎、减轻肝细胞变性和坏死、抗氧化、降血糖、降血脂	[28-29,219-220]
Matricaria chamomilla	精油、萜类、黄酮类、酚类、多糖	抗炎、抗氧化、抗癌、抗菌、神经保护、抗抑郁、保肝、降血糖、止泻	[30-31,221]
Eurycoma longifolia	苦木素类、生物碱、萜类	抗菌、抗焦虑、抗风湿、抗溃疡、抗疟、抗癌、抗炎	[32-33,221]
Passiflora incarnata	黄酮类、酚酸、香豆素、植物甾醇、精油	抗惊厥、抗癫痫、抗氧化、抗癌	[34]
Hebanthe eriantha	三萜类、皂苷、酚类、黄酮类、生物碱	抗氧化、镇痛、抗炎、抗癌	[104-105]
Ribes nigrum	黄酮类、花青素、有机酸、不饱和脂肪酸、多糖	抗癌、抗菌、抗氧化、抗炎、改善血管内皮功能、降血脂、抗凝血	[35,109-110]
Primula veris	酚类、黄酮类、酚酸、酚苷、三萜皂苷	祛痰、抗炎、利尿、抗菌、镇静	[37]
Abelmoschus esculentus	黄酮类、多酚、生物碱、咖啡因、多糖	抗癌、抗菌、抗炎、镇痛、抗疲劳、抗氧化、抗高脂血症、心肝肾胃的神经保护作用	[113-114,116]
Calendula officinalis	三萜、黄酮类、香豆素、醌类、挥发油、多酚、酚酸、脂类	抗炎、抗氧化、抗菌、抗病毒、抗HIV、伤口愈合	[118-119]
Serenoa repens	挥发油;植物甾醇、脂肪酸	抗雌激素、增加二氢睾酮的代谢和排泄、利尿、缓解尿痛	[120-121]

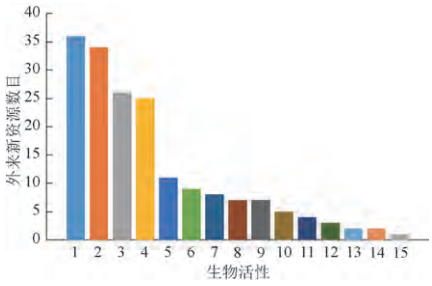
续表3

基原	成分	生物活性	参考文献
Piper methysticum	卡瓦内酯类、黄酮类	镇静、抗炎、抗癌、抗血管生成、抗氧化、免疫调节	[123]
Moringa oleifera	硫代葡萄糖苷、酚类、黄酮类、粗脂肪、脂肪酸、矿物质、总蛋白	抗癌、抗菌、抗氧化、抗炎、镇痛、解热、降血压、抑制溃疡、抗过敏、伤口愈合、抗生育、肝保护	[41,222]
Anthemis nobilis	精油、挥发性化合物、萜类	抗菌、抗炎、抗溃疡、解痉、缓解情绪	[129-130]
Lepidium meyenii	玛咖烯、玛卡酰胺、硫代葡萄糖苷、生物碱、黄酮醇、植物甾醇、多糖	抗氧化、神经保护、抗抑郁、抗疲劳、增强免疫力、抗炎、抗癌、抗病毒	[131,223-225]
Vaccinium macrocarpon	黄酮醇、白藜芦醇、花青素等多酚类	抗氧化、抗癌、控制血糖	[133-134]
Plukenetia volubilis	萜类、酚类、生物碱、黄酮类、皂苷、植物甾醇、单宁、糖苷	抗菌、抗炎、抗氧化、镇痛、抗癌、降血脂、免疫调节	[136,45]
Angelica keiskei	香豆素、黄酮类、萜类、酚类、生物碱	抗炎、抗氧化、抗菌、抗病毒、抗凝血、抗癌、保肝	[46,140-141,143]
Harpagophytum procumbens	环烯醚萜、黄酮类、植物甾醇	抗炎、镇痛、抗氧化、抗病原微生物、抗疟、抗癌	[47]
Withania somnifera	生物碱、黄酮类、甾体内酯、类固醇	抗炎、抗氧化、抗菌、抗癌、免疫调节、降血糖、利尿、镇静、降胆固醇、抗血小板聚集、保护神经心脏、神经和身体健康增强剂	[48,145,148]
Morinda citrifolia	萜类、生物碱、黄酮类、酚类、蒽醌类、环烯醚萜类、木脂素、甾醇、酮类、醇类	抗炎、抗氧化、抗癌、调节脂肪沉积、脂质和葡萄糖代谢和血压、保肝	[49,150,226]
Aesculus hippocastanum	七叶皂苷、槲皮素和山柰酚等多酚	抗炎、抗菌、抗氧化、保肝、抗癌、神经保护	[152-153]
Vaccinium myrtillus	酚类、有机酸	抗氧化、抗炎、抗菌、抗癌、降血压	[52-53]
Salvia hispanica	酚类化合物、黄酮类、黄烷酮类、单宁	抗炎、镇痛、抗氧化、抗凝血、抗抑郁、抗焦虑	[54,154]
Uncaria tomentosa	生物碱、酚酸	抗癌、抗炎、抗氧化、免疫调节	[55-56]
Arnica montana	酚酸、黄酮类、芳香族化合物	抗炎、抗菌、抗真菌、抗氧化、免疫调节	[57]
Silybum marianum	水飞蓟素、其他黄酮类	保肝利胆、心脏保护、心血管保护、神经保护、细胞保护、抗炎、抗癌、镇痛、抗氧化、抗病原微生物	[59,160]
Vitex agnus-castus	生物碱、黄酮类、萜类、牡荆素、蓖麻素、新木脂素、酚类	缓解月经、子宫肌瘤出血、乳房疼痛、异常子宫出血疾病、轻度高催乳素血症、黄体期缺陷、多囊卵巢综合征、前列腺疾病、经前期综合征的偏头痛	[165]
Cephaelis ipecacuanha	生物碱	-	[168]
Aspalathus linearis	黄酮类、挥发性化合物	影响葡萄糖代谢、抗炎、抗氧化	[169-170]
Melissa officinalis	黄酮类、多酚类、萜类、单宁、精油	抗菌、抗病毒、抗寄生虫、抗氧化、抗炎、镇痛、抗过敏、血管舒张、抗血管生成、抗癌、抗风湿、抗抑郁	[62,173]
Kaempferia parviflora	黄酮类、酚类、精油、α-生育酚、类胡萝卜素	抗过敏、抗炎、抗氧化、抗抑郁、抗菌、抗癌、抗胆碱酯酶、心脏保护	[63,176]
Plantago psyllium	酚类、类黄酮、鞣质、环烯醚萜、甾醇	抗氧化、抗炎、抗肝毒性	[182-183]
Matricaria recutita	酚类、黄酮类、倍半萜类、香豆素、挥发油	抗氧化、抗过敏、抗焦虑、抗病原微生物、抗血小板、抗炎、抗抑郁、抗基因毒性、止痛、利尿、解痉	[65-66,190]
Symphytum officinale	生物碱、酚类、三萜皂苷、黏多糖	抗炎	[67,191]
Corynanthe johimbe	生物碱	抗焦虑、抗抑郁	[68,69,196]
Oenothera erythrosepala	酚酸类、黄酮类、亚油酸、γ-亚油酸	抗氧化、抗炎、抗真菌、抗肿瘤、抗病毒、抗血栓、抗乙酰胆碱酯酶	[70,199-200]
Malpighia glabra	花青素、酚类、矿物质、维生素	抗乙酰胆碱酯酶、抗氧化、抗炎、解热、抗菌、抗真菌、保肝	[71,203]
Medicago sativa	生物碱、黄酮类、酚类、植物甾醇、皂苷、挥发性有机物	抗氧化、抗炎、抗癌	[72,205]
Echinacea purpurea	酚类、皂苷、倍半萜、甜菜碱、多糖	抗氧化、抗菌、抗病毒、抗炎、增强免疫功能	[73,206-207,209]
Cimicifuga romose	三萜类、肉桂酸衍生物	神经保护、抗癌	[214]

资源的功能活性研究仍主要集中在抗炎、抗癌、抗感染、神经保护等方面，其他方面研究较少，有待进一步深入。

5 讨论

中药资源是我国中医药事业健康发展的重要物质保障。自古以来我国就有引入和吸纳外来医药的传统，对外来新资源秉持“开放”的态度，且随着中医药对外交流与合作的加强，特别是“一带一路”倡议的提出，将吸纳更多的国外优良药用资源和最新研究成果为我所用。在新形势下引入外来新资源，使其“中药化”和“本土化”，是扩充中药资源的有效途径之一。负载于植物之上的传统药用知识，是人类在缓慢



1. 抗炎;2. 抗氧化;3. 抗癌;4. 抗感染;5. 镇痛;6. 免疫调节;7. 神经保护;8. 抗抑郁;9. 心血管保护;10. 抗过敏;11. 利尿;12. 抗凝血;13. 降血脂;14. 抗风湿;15. 抗惊厥。

图 1　外来新资源的功能活性统计

Fig. 1　Functional activity statistics of new foreign medicinal resources

的医疗实践和反复试错的基础上所形成[10],并固化在当地特定自然资源上所获得的,或可依赖于不同的传统医学形式而延存至今,是今天新药发现的源泉,亦是引进和开发外来新资源的重要依据。对外来新资源传统应用的整理,借鉴原产地的用药经验,有助于扩大我国现有外来新资源的应用和“中药化”深入研究;对外来新资源的化学成分和功能活性整理,将为其开发和利用打下基础。

我国引纳外来新药用资源的积极性正不断提升。在外来新资源研究方面,当前国内已初步形成以药性赋值、功效定位和配伍入方为核心步骤的“中药化”路径[4],为更多外来新资源引入我国积累了理论和方法基础。外来新资源原产国资源丰富,但我国进口依赖度高,存在从事药材栽培的意愿低和人工种植技术匮乏等现象。同时,我国也面临中药资源枯竭、中药资源压力大的发展问题。药用资源调查为传统医药保护与可持续利用提供依据,我国在中药资源保护性开发方面已有所实践,掌握了一定的先进技术。在此基础上,应大力加强与原产国国家在药材资源保护、人工种植研究方面的合作;加强规范化种植技术创新,建设外来新资源基地;结合当地传统医药文化研发具有特色的食品、保健食品、化妆品、功能性日用品等;开展药效学研究与安全性评价,发掘其药用或保健价值[75]。本文对外来新资源的传统应用与现代研究进展进行系统性综述,将有助于拓展其应用范围,为具有开发价值的外来新资源提供参考。

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