基于多指标维度综合评价的梁王茶干燥方式研究Δ

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摘 要 目的 基于多指标维度综合评价梁王茶的不同干燥方式[晒干（SD）、阴干（ND）、热风干燥（HAD）、真空干燥（VD）、真空冷冻干燥（VFD）]。**方法** 采用电子眼评价5种干燥方式样品的外观；采用电子舌评价其滋味；采用扫描电子显微镜评价其微观结构；采用《中国药典》中的方法检测水分、总灰分、酸不溶性灰分、水溶性浸出物含量；采用高效液相色谱法测定新绿原酸、绿原酸、隐绿原酸、3,5-*O*-二咖啡酰基奎宁酸及4,5-*O*-二咖啡酰基奎宁酸含量。以上述指标为变量，进行化学模式识别分析；采用熵权-逼近理想解排序（TOPSIS）结合灰色关联分析法（GRA）对5种样品质量进行综合评价，以变量重要性投影（VIP）＞1.0筛选影响样品质量的关键指标。**结果** 色泽结果显示，5种样品的平均L^*为47.532～56.986、平均a^*为－4.957～－0.718、平均b^*为19.313～28.194。味觉结果显示，5种样品的酸味、苦味响应值均较高。微观形态结果显示，ND样品表面光滑，结构致密；SD样品粗糙且有明显裂纹；VD样品表面相对粗糙，呈层状堆叠形貌；HAD样品结构松散，表面粗糙；VFD样品表面相对光滑。平均水分含量为7.064%～8.513%，平均总灰分为5.214%～5.706%，平均酸不溶性灰分为0.576%～0.720%，平均水溶性浸出物为26.081%～28.395%。5种成分平均含量分别为2.559～8.940、8.731～21.037、1.710～4.479、1.967～6.130、1.199～2.001 mg/g。聚类分析、正交偏最小二乘-判别分析结果均显示，5种样品分为3类，VFD样品与HAD样品分别聚为一类，其余样品聚为一类。绿原酸、L^*、b^*、3,5-*O*-二咖啡酰基奎宁酸、新绿原酸和a^*的VIP值＞1.0。熵权-TOPSIS法结合GRA法结果显示，5种样品的综合贴近度分别为0.414、0.488、0.412、0.452、0.563。**结论** 5种干燥样品中，以VFD样品质量最优，绿原酸、L^*、b^*、3,5-*O*-二咖啡酰基奎宁酸、新绿原酸和a^*是区分不同干燥方式下梁王茶质量的关键指标。

关键词 梁王茶；干燥方式；化学模式识别分析；熵权-TOPSIS法；灰色关联度法；电子感官技术

Study on the drying method of *Metapanax delavayi* based on multi-index dimension comprehensive evaluation

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ABSTRACT OBJECTIVE To comprehensively evaluate the different drying methods of *Metapanax delavayi* based on multi-index dimensions, including sun drying (SD), shade drying (ND), hot air drying (HAD), vacuum drying (VD), and vacuum freeze drying (VFD). **METHODS** An electronic eye was used to evaluate the appearance of samples with five drying methods. An electronic tongue was used to evaluate taste. The microstructure was evaluated by scanning electron microscope. The contents of moisture, total ash, acid-insoluble ash and water-soluble extract were detected by the methods in *Chinese Pharmacopoeia*. The contents of neochlorogenic acid, chlorogenic acid, cryptochlorogenic acid, 3,5-*O*-dicaffeoylquinic acid and 4,5-*O*-dicaffeoylquinic acid were determined by high-performance liquid chromatography. The comprehensive quality evaluation of five samples based on chemometrics, entropy weight-technique for order preference by similarity to ideal solution (TOPSIS) and grey relational analysis (GRA) with the above indicators as variables, the key indicators affecting the quality were screened by variable importance in projection (VIP) >1.0. **RESULTS** The color results of five samples showed that average L^*, a^*, b^* ranged from 47.532 to 56.986, −4.957 to −0.718, 19.313 to 28.194, respectively. The taste results of the five samples showed that the presented high response values were for sourness and bitterness. Microstructural observation demonstrated that the ND samples showed smooth surfaces with compact texture; SD samples exhibited rough surfaces with obvious cracks; VD samples showed relatively rough surfaces with layered stacked morphology; HAD samples showed loose and coarse structures; VFD samples showed relatively smooth surfaces. The average moisture content ranged from 7.064% to 8.513%, the average total ash

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