

LETTER TO THE EDITOR

Pyrolysis Molecules of Chinese Buckeye Seed from Pharmacy Waste

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This paper analyzes ChineseBuckeyeSeed using TG to analyze organic solvent extracts, the pyrolysis product was then analyzed by Py-GC-MS. The results show that the ChineseBuckeyeSeed is mainly healthy and rich in ChineseBuckeyeSeed extracts, The main representative of the active ingredient are Furfural, Isosorbide Dinitrate, Catechol, 1,2-Benzenediol, 4-methyl-, 3-Amino-s-triazole, 2,3-Quinoxalinedione, 1,4-dihydro-, Docosanoic acid, Medetomidine. ChineseBuckeyeSeed extract contains a large amount of biologically active ingredients, including acids, phenols, alcohols, ketones and ethers, not only in the fields of bioenergy, biomedicine, cosmetics, skin care and fragrance, but also potential application prospects, ChineseBuckeyeSeed's chemical composition research provides a scientific basis for the development and utilization of this plant.

I Introduction

As the human society and population grow, the surge in energy demand is forcing human life and the Earth's terrestrial ecosystem to face unprecedented pressure, bioenergy is an indispensable part of many other renewable energy sources (Konur 2012, Long et al. 2013). Peels and seeds are generally considered waste, causing trouble with waste management, but can now be used as a raw material of commercial importance (Gupta and Solanki 2015). *Sorbus tianshanica* Rupr foliage extract has anti-asthmatic, expectorant, anti-inflammatory and immunomodulatory effects (Ma et al. 2015), the volatile oil of *Lonicera japonica* is mainly composed of acids, terpenoids and alcohols, and has good antioxidant activity in vitro (Bi et al. 2015). *Terminalia chebula* has analgesic activity (Ahmed et al. 2012), *Cornus officinalis* and *Acer palmatum* cv. *atropurpureum* have antiviral activity (Ren et al. 2016), the aglycone flavonoids in grapefruit have anti-inflammatory, anti-cancer, anti-lipid peroxidation and liver protection effects, as well as inhibition of obesity (Wei and Gui. 2016), *Microcos paniculata* as a potential source of antimicrobial agents and their toxicity and insecticidal potential (Aziz 2014). *Rhodomyrtus tomentosa* can reduce uterine bleeding in women (Qaraaty et al. 2014), *Zanthoxylum armatum* contains flavonoids and terpenoids (Mehta et al. 2013), *Physalis peruviana* Linn also has a role in the treatment of diabetes (Sathyadevi and Subramanian 2014), Apple has significant antibacterial activity against enterococcus and streptococcus mutans (Behera et al. 2017), *Embllica officinalis* has anti-neotoxic effects (Kalra et al. 2017), *Pandanus odoratissimus* methanol extract has significant antidiarrheal activity (Rahman et al. 2014). Since few studies focus on the composition of ChineseBuckeyeSeed, this paper uses TG and Py-GC-MS techniques to study the potential of Chinese BuckeyeSeed is biomass energy and food flavors.

II Material and Methods

The samples were collected from the Xixia forest area of Henan Province. The sample was processed into a powder from fresh material.

TG Analysis: The samples of ChineseBuckeyeSeed were analyzed by thermogravimetric analyzer (TGA Q50 V20.8 Build 34). The nitrogen release rate was 60 ml/min. The temperature program of TG started at 30°C and rose to 300°C at a rate of 5 °C/min (Lam et al. 2019).

Py-GC-MS Analysis: Catalyzed and pretreated samples were analyzed by pyrolysis-gas chromatography-mass spectrometry (CDS5000-Agilent 7890B-5977A ISQ). Carrier gas for high purity helium, pyrolysis temperature of 500°C, heating rate of 20 °C/ms, pyrolysis time of 15 s. (Gao et al. 2017) Pyrolysis product transfer line and injection valve temperature was set at 300°C; HP-5MS column; capillary column (60 m × 250 μm × 0.25 μm); parallel mode, the split ratio 1:60, shunt speed 50 mL/min. The temperature of the GC program was raised from 40°C for 2 minutes, raised to 120°C at a rate of 5 °C/minute and then raised to 200°C at a rate of 10 °C/minute for 15 minutes. Ion source (EI) temperature of 230°C, the scanning range of 28 amu-500 amu (Chen et al. 2017).

III Results and Discussion

Analysis of TGA and DTG

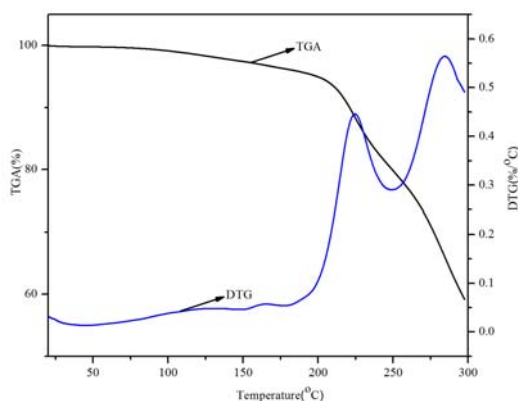


Fig. 1. TGA and DTG curves of ChineseBuckeyeSeed

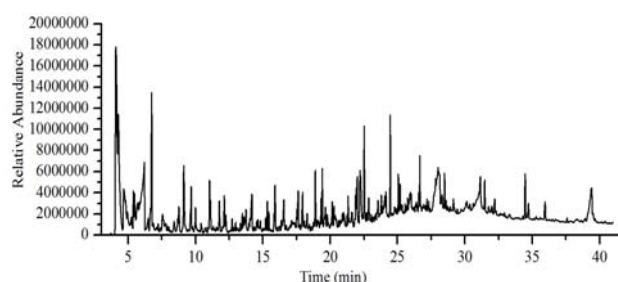


Fig. 2 Total ion chromatograms of Chinese Buckeye Seed by Py-GC-MS.

Figure 1 is a TGA and DTG curve. TGA is used to determine the change in sample weight. The DTG curve indicates the mass loss rate and the estimated degree of thermal degradation, (Jin and Mi, 2019) therefore, in order to study the quality change and rate of change of ChineseBuckeyeSeed, and we conducted a TGA test. It can be seen from the figure that the pyrolysis weight loss process can be divided into three stages, the first stage is between 20-104°C (Ge et al. 2017), the weight loss is small for the water evaporation stage, and the weight loss

is mainly caused by the loss of biomass (Lou et al. 2018), the second stage is between 104-230°C. (Gao et al. 2017) The differential curve at this stage is relatively flat, indicating that the pyrolysis rate is relatively stable, and the sample begins to show significant weight loss, the weight loss is mainly caused by a small amount of polymer depolymerization and recombination inside the sample (Zhao et al. 2018), the third stage is between 230-300°C, the combustion phase of the remaining components, as the temperature increases (Peng et al. 2018), Chinese Buckeye Seed rapidly decomposes cellulose and hemicellulose to form a large amount of volatile gas and causes weight loss. T1wt%, T3wt% and T15wt% for weight loss of 1wt%, 3wt% and 15wt%, respectively T1wt%, T3wt%, and T15wt% are 104°C, 155°C and 230°C, respectively, these three stages exhibit different properties with different kinetic parameters and reaction mechanisms (Ashraf et al. 2018).

Analysis of Py-GC-MS and Function

Chinese Buckeye Seed products have certain human health functions, and we have obtained the proven active ingredients of human health. Furfural is a naturally occurring furan aldehyde with many commercial uses such as industrial manufacturing, food flavors, fragrances in personal care products, insecticides, furfural and chitosan derivatives for synthesis and antibacterial properties (Reed and Kwok 2014). Isosorbide Dinitrate is a fast-acting, long-acting nitrate anti-angina drug used primarily for the prevention of pre-angina attacks and coronary dilatation agents for the treatment of angina pectoris (Kekeç et al. 2015). Catechol is an important pharmaceutical intermediate that can be used to make cough expectant, eugenol, berberine and isoproterenol (Dauvilliers et al. 2015). 1,2-Benzenediol, 4-methyl- is used in the synthesis of antibacterial agents and antioxidants. The two novel synthetic methyl benzenediol derivatives have antioxidant activity (Monnier et al. 2013). 3-Amino-s-triazole can be used as a pharmaceutical intermediate, a derivative of anti-microbial and anti-biofilm activity, and can also be used as a potential antibacterial agent (Stefanska et al. 2016). 2,3-Quinoxalinedione, 1,4-dihydro- synthetic quinoxaline antineoplastic, antifungal, central nervous system sedative, derivatives can be used as activators of AMPK-activated protein kinases (Shi et al. 2015). Docosanoic acid is used as an organic synthesis, behenic acid can be used as a pharmaceutical fungicide, agricultural insecticide, cosmetic additive (Xie et al. 2017). Selective vagus activation of Medetomidine may be beneficial for vagal activation in patients with HF. It has significant anesthetic effects in laparoscopic cholecystectomy and can effectively maintain hemodynamic stability and induce stress in elderly patients undergoing laryngoscopy. Reactions and side effects (Sun et al. 2017).

IV Conclusion

As can be seen from the above studies, Chinese Buckeye Seed active ingredients have antibacterial, pharmaceutical and insecticidal activities, the main components of bio-oil obtained by biomass pyrolysis are almost all oxygen-containing organic substances, which are mainly classified into acids, ketones, alcohols, aldehydes, phenols and the like TGA-DTG and Py-GC-MS tests showed, in wood extracts, many of the organic matter is the same as the organic matter or homologue in the biomass oil, and the residue after the proposed active ingredient can be used as part of the biomass liquid fuel in future use. This study provides a scientific basis for the comprehensive utilization of Chinese Buckeye Seed extracts in high-end resources such as bioenergy, biomedicine, biopesticide, cosmetics, skin care products and spices.

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