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EFFECT OF CHEMICAL PRODUCTS ON COTTONSEED OIL EXCRETION

Samadova Kh. S. Email:samadovaxadicha@gmail.com

Bukhara State Medical Institute named after Abu Ali ibn Sina, Uzbekistan, Bukhara, st. A. Navoi. 1 Tel: +998 (65) 223-00-50 e-mail: info@bsmi.uz

✓ ***Resume***

Cottonseed oil (CSO) important product extracted from one of byproducts cottonseeds. Oil yield varies with cotton species, places and season when cotton grown and extraction methods used for oil extraction. This review provides an overview on the extraction of CSO by different chemical, biochemical and mechanical methods. Functional characterization and physicochemical evaluation of CSO demonstrated the superior quality as compared to other vegetable oils. Health benefits of CSO and its uses as edible oil in food and other industrial applications are also described. CSO with well-developed extraction method, good fatty acid profile with safe levels of gossypol is healthy and edible for human consumption.

Keywords: Cottonseed oil; Functional properties; Fatty acids; Nutrition.

PAXTA YOG’I EKSKRETSIYADA KIMYOVIY MAHSULOTLARNING TA’SIRI

Samadova Kh. S. Email:samadovaxadicha@gmail.com

Abu Ali ibn Sino nomidagi Buxoro davlat tibbiyot instituti, O‘zbekiston, Buxoro, st. A. Navoiy. 1 Tel: +998 (65) 223-00-50 e-mail: info@bsmi.uz

✓ ***Rezyume***

Paxta yog'i (PY) paxta chigitining qo'shimcha mahsulotidan olinadigan muhim mahsulot. Yog ' hosildorligi g'o'za turiga, paxta yetishtiriladigan joy va mavsumga va moy olishda ishlatiladigan ekstraksiya usullariga qarab farq qiladi. Ushbu sharh turli xil kimyoviy, biokimyoviy va mexanik usullar bilan PY ni olish haqida umumiy ma'lumot beradi. Paxta yog’ining funksional tavsifi va fizik-kimyoviy bahosi boshqa o'simlik moylariga nisbatan yuqori sifatni ko'rsatdi. Paxta yog’ining sog'liq uchun foydalari va undan oziq-ovqat va boshqa sanoat ilovalarida iste'mol qilinadigan yog' sifatida foydalanish ham tavsiflangan. Yaxshi ishlab chiqilgan ekstraksiya usuli bilan PY, xavfsiz gossipol darajasiga ega va inson iste'moli uchun iste'mol qilinadi.

Kalit so'zlar: Paxta yog'i;funktsional xususiyatlar; yog 'kislotalari; oziqlanish.

ВЛИЯНИЕ ХИМИЧЕСКИХ ПРОДУКТОВ НА ВЫВЕДЕНИЕ ХЛОПКОВОГО МАСЛА

Самадова Х.С. Email:samadovaxadicha@gmail.com

Бухарский государственный медицинский институт имени Абу Али ибн Сины, Узбекистан, г. Бухара, ул. А. Навои. 1 Тел: +998 (65) 223-00-50 e-mail: info@bsmi.uz

✓ ***Резюме***

Хлопковое масло (ХМ) важный продукт, добываемый из одного из побочных продуктов семян хлопка. Выход масла варьируется в зависимости от вида хлопка, места и сезона выращивания хлопка, а также методов экстракции, используемых для добычи масла. В этом обзоре представлен обзор экстракции ХМ различными химическими, биохимическими и механическими методами. Функциональная характеристика и физико-химическая оценка ХМ продемонстрировали превосходное качество по сравнению с другими растительными маслами. Также описаны польза ХМ для здоровья и его использование в качестве пищевого масла в пищевых продуктах и других промышленных целях. ХМ с хорошо развитым методом экстракции, хорошим профилем жирных кислот и безопасным уровнем госсипола полезен для здоровья и съедобен для потребления человеком.

Ключевые слова: Хлопковое масло; Функциональные свойства; Жирные кислоты; Питание.

Introduction

Various seed oils have been extracted until now and the plea for their isolation and extraction has just increased because the seed oils contain many biological substances that are important for the treatment of chronic degenerative and cardiac diseases (O'Brien & Wakelyn, 2005). A standard laboratory process used for seed oils extraction is the Soxhlet method with organic solvents, which are generally combustible, affluent, noxious, and cause environmental on tamination. The recent techniques employed for the extraction of seeds are solvent extraction and pressing, ultra-sound-assisted, and microwave-assisted, extraction, enzyme-assisted extraction (E-AE), and supercritical CO2extraction(SC-CO2) (Wael Abdelmoez et al., 2011). Additionally, less chemical lresidue and contamination were detected from the extracted oil. However, E-AE is also a new and promising technique for CS-O extraction. E-AE enhances the oil yield and improves product quality. In this technique, the cell wall and partial decomposition of fiber are broken down, which ultimately enhances the oil yield during the extraction process using enzymes (Zuniga et al., 2003). Various reviews have been published previously on edible oils extraction and their physicochemical properties, but CS-O is not reviewed before. Therefore, a comprehensive review of CS-O is required to describe CS-O beneficial properties and importance. In this review, the importance, byproducts, physicochemical characteristics, and nutritional profile of CS-O have been explained in detail. Moreover, this paperal so provides a comprehensive review of CS-O, its positive benefits, fatty acid profile, extraction techniques, and health applications.

Cottonseed oil (CS-O)

CS-O covers almost 50% of necessary poly-unsaturated lino-leic acid; while about 30% of linoleic acid is available intraditional cooking oils (sesame oil, safflower oil, olive oil, coconut oil, etc.), which is compulsory in human nutrition because it inhibits the hardening of coronary veins, but the human body cannot biosynthesize it naturally. Moreover, itis nontoxic and appropriate for the human diet (Waheedet al., 2010). As specified previously, CS-O has abundant natural antioxidant com-pounds, which make CS-O a natural additive that prolong the shelf life and frying cycle of oil for many foods (Sekhar& Rao, 2011). Raw CS-O is toxic due to the G-P content present in it, but this toxicity is beneficial for agricultural perception. Many vegetable oils have tremendous applications in regulating mite vermins and insects (Bertrand et al.,2005). CS-O is the most value-added by-product of CS that can fulfill the nutritional requirement of consumers. Various methods were applied to extract CS-O such as solvent extraction, water extraction, enzyme assisted, and ethanol extraction (Delgado et al., 2019; Qian et al., 2008;D.K.Saxena et al., 2011). CS-O is an exceptional oil used in fried snacks where mouth feel, storage stability, and texture are major considerations. CS-O gives a nutty taste to potato chips and is preferred by US customers.

Cottonseed oil extraction techniques

Edible oil cooking is a time and energy-consuming process in the oil extraction industries. The cooking process is executed before oil extraction and after oilseed flaking. Before the extraction of oil, heat treatment is given to the oilseeds. The main reason for cooking or heat treatment of oilseeds is the denaturalizing of cell proteins to extract the oil smoothly. It can assist the amalgamation of oil into the droplets, which could produce emulsions. The heat treatment can also reduce the impurities of crude CS-O during extraction and helps decrease the oil loss during refining. Heat treatment also binds G-P and dissolves the oil present in cells of plants and simplifies its extraction process with high yield (Akoh, 2017; Taghvaeiet al., 2015). Several techniques have been used for the extraction of CS-O which are given below.

Physicochemical properties of cottonseed oil Triacylglycerol (TAG) and fatty acids (FA)CS-O color is light to dark yellow with characteristic odor and nutty flavor attained from the seed treatment which can be removed through purification. The physicochemical com-position of CS-O is given in table 3. The composition and conformation of fatty acid in triacylglycerol (TAG) are the main parameter for determining the physicochemical characteristics of any oil (Ghazani and Marangoni, 2016). CS-Ois high in linoleic acid, which improves blood pressure, plays a distinct part in heart health and insulin compassion(O'Brien & Wakelyn, 2005; Spadaro & Gardner, 1979;Zhong et al., 2013). However, almost all the seed oils undergo degradation and the reason behind this quality defect is mainly the oxidation reaction during heating (cooking, and frying). Autoxidation is an oxidation process, mostly occurs in edible oils when unsaturated fatty acids react auto-catalytically with oxygen through a free radical chain mechanism. It includes instigation, proliferation, and closure phases (Taghvaei et al., 2014).

CS-O was also used in broiler diets as an alternative com-ponent. It inhibits the absorption of glucose and has direct effects on intestinal enzymes. The addition of iron salts, for example, ferrous sulfate, can prevent toxic effects (FS).Another study has evaluated the performance of antioxidant enzymes superoxide

decmutase (SOD), catalases (CAT), and glutathione peroxidase, and their expression was achieved ingenes (Araujo et al., 2019). To improve the product's shelf life, CS-O was treated with gallic acid, rutin, and carotenoids, and oxidized at four different temperature values in accelerated conditions. Moreover, it was kept at temperatures between 110 and 140□C for several days in ambient conditions and the nature of the oxidation response wasproved to be endothermal and non-spontaneous with pure and treated CS-O (Kurtulbas¸ et al., 2018).

Conclusions

CS-O has appeared as a good source of edible oil with beneficial assets when applied in numerous areas such as industrial, medicinal, and food fields. CS-O could be advantageous in inhibiting cancer and cardiovascular dis-eases because it contains numerous bioactive components, particularly PUFA, MUFA, and antioxidants. It is believed that high tocopherol content leads to the high oxidative stability of the CS-O during processing and storage. It has an ample magnitude of tocopherols, which are incredibly beneficial for health and well-being. Several plant sterols with particular structures inhibit oxidative deterioration of oils that serveas potential anti-polymerizing agents for frying oils. The most abundant sterol in CS-O is sitosterol, followed by camp esterol and stigmasterol. CS-O possesses numerous bio-logical actions, e.g., anti-oxidation, anti-inflammatory, anti-cancer, and wound healing, owing to phytochemicals and terpenes.

In the cotton plant, G-P is a yellow-pigmented phenolic compound; it is a natural toxin that shields it from insect damage and is also poisonous to humans. G-P level is0.05–0.42% in crude solvent-extracted oil and 0.25–0.47% incrude screw-pressed oil. While almost all G-P is extracted during processing to avoid the risk of toxicity, but the quality of the oil remains affected by a sufficient quantity of G-P. Recent research has shown that this component has bio-active properties such as antimicrobial, antioxidant, and anticancer activities.

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