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RESEARCH PAPER

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Important Equipment and Tools for Extracting Castor Oil Hamid Kheyrodin

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ABSTRACT

Castor bean (*Ricinus communis* L., 2n = 2X = 20) is a monophyletic species belonging to the Euphorbiaceae family, which includes 280 genera and 8000 species. The origin of R. communis is Africa and then it was taken to India and China. Castor oil is a vegetable oil pressed from castor beans, the seeds of the plant Ricinus communis. The seeds are 40 to 60 percent oil. It is a colorless or pale vellow liquid with a distinct taste and odor. Its boiling point is 313 °C (595 °F) and its density is 0.961 g/cm3. It includes a mixture of triglycerides in which about 90 percent of fatty acids are ricinoleates. Oleic acid and linoleic acid are the other significant components. Some 270,000-360,000 tonnes (600-800 million pounds) of castor oil are produced annually for a variety of uses. Castor oil and its derivatives are used in the manufacturing of soaps, lubricants, hydraulic and brake fluids, paints, dyes, coatings, inks, cold-resistant plastics, waxes and polishes, nylon, and perfumes. A castor oil press is also called a castor oil extraction machine. Using a castor oil press is one of the most used ways to extract oil from nuts, seeds, using a castor oil press. Gentle Pressure and Proper Technique: When performing extractions, apply gentle and steady pressure to avoid causing damage to the skin. Be mindful of sensitive or thin skin areas, and avoid over-twisting or over-squeezing. Fully clear impactions and debris to prevent rapid re-clogging.

Keywords: Castor bean (*Ricinus communis* L.), Castor oil, Castor tools extraction, Oleic acid and linoleic acid.

INTRODUCTION

Castor oil among the vegetable oils, is naturally oil composed mainly of the ricinoleic acid that contains both a hydroxyl group and double bond rendering castor oil to be a starting material as a polyol in various chemical reactions and industrial applications.

Castor oil is a valuable, economical, non-edible raw material in terms of price and quality. Presently, the use of vegetable oil has gained attraction for commercial production of biodiesel as a result of its high content of ricinoleic fatty acid and the possibility to esterify with only methanol (Osorio-Gonzalez et al., 2020). Vegetable oils are crucial to the food, pharmaceutical, medical, and industrial sectors. More oil from natural plants is urgently needed. Among its many benefits are renewable energy, environmental friendliness, ease of production in rural areas, and the economic value of its oil for industrial and medicinal purposes. Castor seed (*Ricinus communis*) is a non-edible oil seed that is widely cultivated, as shown in Figure 1 (Salau et al., 2021). The plant's seed, the castor bean, is primarily used for body ointments, lamps, lighting, and enhancing the growth and texture of hair. Its oil is also utilized in medicine to treat parasitic worm infections and arthritis. The oil found in the seed's ranges from 40% to 60% and is rich in triglycerides, primarily ricinolein, which is a water-soluble toxin that is absent from the plant's structure (Adeodu et al., 2022).



Figure 1. Castor Oil Manufacturing Process.

Automatic spiral oil press machine suitable for rapeseed, peanut, soybean, sunflower, rapeseed, sesame seed, tea seed, walnut, olive, corn germ, rice bran, safflower seed, seeds of hippophae rhamnoides and so on. It's mainly composed of electric control, automatic heating, adjustment, transmission and vacuum oil filter components.

Name:	6YL-120A oil press machine
Motor:	15kw
weight:	1080kg
Dimension:	2200*1200*1850mm
Material:	Carbon steel and stainless steel
voltage:	380v, three-phase, 50Hz
Production capacity	250-350kg/hour
Oil type:	Various raw materials for making oil
Package:	Wooden Case
Warranty of core components:	1 Year

Table 1. Castor oil machine motor characteristics.

RESULTS AND DISCUSSIONS

We studied the invention discloses a hydrogenated castor oil sulfosuccinate fatting agent and a preparation method thereof. Through maleic anhydride mono-esterification and then sodium hydrogen sulfite sulfonation, the fatting agent is prepared from hydrogenated castor oil containing hydroxyl as an initial raw material. The fatting agent is milky paste, is not layered at a room temperature in 3 months and can be emulsified in water. Based on a dilution ratio of 1: 9, the fatting agent is not layered in 24h and does not produce floating oil and based on a dilution ratio of 1: 4, the fatting agent is not layered in 12h and does not produce floating oil. A result of emulsion detection adopting 100g/L of tannin extract, 100g/L of a chromium salt, 1mol/L of hydrochloric acid and 1mol/L of ammonia water shows that the fatting agent has good emulsion stability, cannot be layered and does not produce floating oil.





Castor oil is well known as a source of ricinoleic acid, a monounsaturated, 18-carbon fatty acid. Among fatty acids, ricinoleic acid is unusual in that it has a hydroxyl functional group on the 12th carbon atom. This functional group causes ricinoleic acid (and castor oil) to be more polar than most fats. The chemical reactivity of the alcohol group also allows chemical derivatization that is not possible with most other seed oils. Figure 3 shows Chemical structure of Epoxidized Castor Oil (ECO).



Figure 3. Shows chemical structure of castor oil.



Figure 4. Castor oil growing in Semnan University greenhouse.

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The medicinal properties of *R. communis* are due to the presence of some phytochemical compounds like flavonoids, phenolic acids, glycosides, alkaloids, steroids, and terpenoids. The antioxidant activity of phytochemical components of this plant is considered in the treatment of tumors and cancers. In addition, the plant is reported to possess other medicinal properties such as anti-diabetic, anti-microbial, anti-viral, anti-aging, anti-dermatophytic, anti-inflammatory, anti-nociceptive, and anti-hepatotoxic.



for GC and HPLC analyses.

CONCLUSION

An oil extraction machine, also called an oil press or expeller, uses high pressure and heat to "squeeze" the oils out of a plant product. Those products — including seeds, nuts, vegetables, fruits and leafy plants — release their oils through this mechanical process, which is often done without adding any chemicals. Professional dental practitioners use dental extraction tools like forceps, elevators, curettes, etc. These help them make the treatments as much atraumatic and simplified as possible.

The castor seed contains ricin, a toxic lectin. Heating during the oil extraction process denatures and deactivates the lectin. Harvesting castor beans, though, may not be without risk. The International Castor Oil Association FAQ document states that castor beans contain an allergenic compound called CB1A. This chemical is described as being virtually nontoxic, but has the capacity to affect people with hypersensitivity.

The allergen may be neutralized by treatment with a variety of alkaline agents. The allergen is not present in the castor oil itself Dierig. (1995). Based on the results obtained, it can be concluded that the genotypes placed in the third cluster in both years are superior in traits of apomixis ability and yield components. Therefore, the same genotypes in the third cluster in both years, i.e., USA 2, Brazil 2, Iran, Syria, Isfahan, and Yazd had the highest apomixis ability among the studied genotypes. As shown, the castor bean collection used in this study was not grouped based on geographical distribution figure 5.

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REFERENCES

- Adeodu, A.O., Tamunosaki, T.A., Daniyan, I.A. and Maladhzi, R.W. (2022). Development of a motorized castor oil extractor from locally sourced materials. AIP Conf. Proc. 2437, 020137.
- Busari, R.A., Olaoye, J.O., Adebayo, E.S. and Fadeyibi, A. (2022). Development and evaluation of a combined roaster expeller for castor oil seeds for biodiesel production. Research in Agricultural Engineering, 68(4), 169-179.
- Dierig, David A. (1995). "Lesquerella". New Crop FactSHEET. Center for New Crops & Plant Products, at Purdue University. Archived from the original on 2007-10-25. Retrieved 2007-08-01.
- Isa, J., Ojekunle, E. and Olalusi, A.P. (2022). Development and Performance of a Castor Oil Extractor. Journal of Ethnopharmacology, 13 (1). https://www.researchgate.net/publication/361678120
- Kamalakar, K., Mahesh, G., Prasad, R.B. and Karuna, M.S. (2015). A Novel Methodology for the Synthesis of Acyloxy Castor Polyol Esters: Low Pour Point Lubricant Base Stocks. Journal of Oleo Science, 64, 1283-1295. https://doi.org/10.5650/jos.ess15133
- Osorio-Gonzalez, C.S., Gomez-Falcon, N., Sandoval-Salas, F., Saini, R., Brar, S.K. and Ramirez, A.A. (2020). Production of Biodiesel from Castor Oil: A Review. Energies, 13, Article 2467.
- Salau, A.O., Deshpande, D.S., Adaramola, B.A. and Habeebullah, A. (2021). Design and construction of a multipurpose solar-powered water purifier. In: Smart innovation, systems and technologies, 196, 377-387.

https://doi.org/10.1007/978-981-15-7062-9 37.

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