EXPLORING MEDICINAL PLANTS

EXPLORING POISONOUS PLANTS

MEDICINAL VALUES, TOXICITY RESPONSES, AND THERAPEUTIC USES

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20 *Ricinus communis* (Castor Oil Plant)

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20.1 INTRODUCTION

Plants are man's best companion, providing him with food, medicine, and fuel since the dawn of civilization (Garekae et al. 2022). Plants are still a key basis of medicine. Throughout history, societies all across the globe have discovered how to employ medicinal plants to treat sickness (Odieka et al. 2022). Their application is more relevant in present day scenario as they have comparably less side effects. This has led researchers to focus on plants that have medicinal efficacy. Plants have a variety of bioactive chemicals that have the potential to be developed as therapeutic medicines (El-Saadony et al. 2021; Husen et al. 2021; Husen 2021, 2022). The global demand for herbal medicines is increasing (Liu et al. 2021). Hence, uncontrolled practices with a lack of concern on conservation efforts are now endangering medicinal plants (Sofi et al. 2022) through the validation of traditional medicines, ethnopharmacological practices, and indigenous therapies (Xue et al. 2022).

There are several natural crude drugs in traditional medicine that have the efficiency to cure a variety of ailments and problems, one of them is *Ricinus communis* L. (family: Euphorbiaceae) commonly known as Castor bean (Kebede and Shibeshi 2022). It is a monotypic species having 60% distinctive oil, 90% of which is ricinoleic acid. As it has low solidification point (12°C–18°C), high molecular weight, very low melting point (5°C) and is stable having high viscosity, this acid has a lot of industrial importance (Pham et al. 2022). Ricinoleic acid is accountable for castor bean oil's popularity, since it has the greatest and high stable viscosity index of any vegetable oil, as well as excellent lubricity, particularly at low temperatures (Rodríguez-Cabal et al. 2020; Porokhovinova et al. 2022).

Castor is a non-oilseed plant with significant nutritional potential due to its 90% monounsaturated fatty acids concentration along with bioactive compounds like phenolics, vitamin E (tocotrienols or tocopherols), and phospholipids (Yeboah et al. 2020; Sbihi et al. 2018). These biocompounds contribute to castor oil's taste as well as stability, making it appropriate for a wide range of applications (Sedeek et al. 2012). In castor oil, tocopherol is a natural antioxidant that has anti-inflammatory and anti-proliferative activities. The major tocopherol isomers, 30.89–52.7 mg/g for γ and 43.1–96.62 mg/g for δ, are greater than those found in sunflower, hazelnuts, and olives (Said et al. 2016; Sbihi et al. 2018). Castor oil also has good oil quality due to its physicochemical qualities like high thiobarbituric acid and saponification value and low iodine and acid value (Omari et al. 2015).

On the other hand, Castor bean cultivation is complicated due to the presence of ricinine alkaloid, toxic ricin, as well as allergenic protein polysaccharide Castor bean allergenic fraction (CB-1A) in the plant. Ricin inhibits the synthesis of protein by inactivating ribosomes which is harmful in any form. Ricin which is one of the most powerful plant poisons is also found in castor beans.

Fritz Hauschild considers ricin in the list of five most dangerous compounds known: gramicidin, diphtheria toxin, tetanus toxin, botulinum toxin, and ricin (Hauschild 1960). As a result, it is not surprising that castor plant has been designated as a "poisonous plant 2018" in Germany.

20.2 BOTANICAL DESCRIPTION

Castor bean is a 5 m tall, semi-woody lager shrub or small tree and evergreen herbaceous plant (Figure 20.1). This plant is rapid growing that at first it grows straight up and then branches later. The stem varies in colour from green to reddish purple and has hollow internodes. Flowers are greenish yellow.

20.3 DISTRIBUTION

Although the castor bean is native to the Eastern Africa, Southern Mediterranean Basin, and India, it is thought to have originated from tropical Africa. Castor bean is extensively cultivated in subtropical, tropical, and temperate regions; it optimally grows in summer rainfall areas notably India, Brazil, and China due to its significant economic worth (Kamusoko and Jingura 2022). Breeders are