



Essential oil from the seeds of *Moringa peregrina*: Chemical composition and antioxidant potential

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ABSTRACT

In the present study, the chemical composition and antioxidant potential of essential oil from the seed kernel of *Moringa peregrina* were studied. Gas Chromatography and Gas Chromatography–Mass Spectrometry analyses of the essential oil revealed that the oil contains 33 compounds. Among that, geijerene was identified as the major compound (33.38%) followed by linalool (23.36%), caryophyllene oxide (19.28%), *n*-hexadecane (12.59%) and carvacrol (1.89%). The antioxidant activity indicated that the essential oil has DPPH[•] radical (IC₅₀ = 37.70 µg/mL), ABTS^{•+} radical (IC₅₀ = 34.03 µg/mL), superoxide anion (IC₅₀ = 36.57 µg/mL), nitric oxide radical (IC₅₀ = 29.15 µg/mL), hydrogen peroxide (IC₅₀ = 43.93 µg/mL) and hydroxyl radical (IC₅₀ = 29.99 µg/mL) radical scavenging activities. Thus, the essential oil of *M. peregrina* can be considered as an alternate choice to the synthetic antioxidants.

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1. Introduction

Moringa peregrina (Moringaceae) is a tropical plant and native to the arid and semi-arid regions of the Arabian Peninsula, Southwest Asia and Northeast Africa (Olson, 2002). The plant is widely cultivated for the source of oil and gum (Kær et al., 1979; Jahn et al., 1986). It is a deciduous and fast growing tree up to 10 m height with white bark. The leaves of the plant are imparipinnate with early deciduous leaflets, bisexual flowers, showy and yellowish white to pink in color. This plant bears 20–40 cm long pendulous seed pods and each pod contains 15–20 angled, nut like unwinged seeds and the seeds have sweet bitter taste (Padayachee and Bajinath, 2012; ICUN, 2005). The seeds of *M. peregrina* have much economic importance as the seed kernel contains 42–54% of fixed oil content (Afsharypuor et al., 2010; Asghari et al., 2015). Due to the non-sticky and odorless nature (Zaghloul et al., 2010), the seed kernel oil has many industrial-oriented applications such as a lubricant (Sharma et al., 2009) and in cosmetic preparations (Kleiman et al., 2008). Moreover, studies revealed that the seed oil of *Moringa* is one of the potential sources for biodiesel production (Salaheldeen et al., 2014; Salaheldeen et al., 2015 and also is fit for human consumption (Tsakins, 1998; Gharibzadeh et al., 2013). The

oil can also be utilized for other purposes such as shortening production and hydrogenation etc. (Salaheldeen et al., 2015).

In food industry, antioxidants play a vital role in food preservation to avoid the oxidative damage and its undesirable effects in food quality (Lorenzo et al., 2018). During food processing, the synthetic antioxidants such as butylated hydroxyanisole (BHA), butylated hydroxytoluene (BHT), propyl gallate (PG) and tert-butylhydroquinone (TBHQ) are commonly used as food additives to prevent/delay the oxidative damage (Baydar et al., 2007). The limited uses of these antioxidants are permitted either alone or in combination to prolong the shelf life of foodstuffs. However, the *in vitro* and *in vivo* safety assessments showed that the uses of synthetic antioxidants in high concentrations showed negative effect (Hocman, 1988; EFSA, 2011; EFSA, 2012; Yang et al., 2018). Thus, nowadays consumers are preferring foods preserved with natural antioxidants/preservatives. So, to fulfill the consumers' desire, the food producers/manufacturers and researchers are always searching for preservatives from the natural source. Plants are the predominant source of secondary metabolites that are having a range of biological activities including antioxidant efficacy. Recent report showed that the plant essential oils have greater antioxidant potential (Benabdallah et al., 2018).

The previous investigations on *M. peregrina* seeds were mainly focused on the fatty acid composition as well as fixed oil content and it was summarized in the recent review (Senthilkumar et al., 2018). To best of our knowledge, there is no detailed report on the essential oil of *M. peregrina* seeds. So, the present study was aimed to focus on the chemical composition and antioxidant activity of *M. peregrina* seed kernel oil.

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