OIL EXTRACTION AND TOTAL CAROTENOID DETERMINATION OF SEA BUCKTHORN (*HIPPOPHAE RHAMNOIDES SSP. MONGOLICA*) SEED OF MONGOLIAN ORIGIN

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ABSTRACT: *This paper describes oil extraction yield from 3 seabukhthorn seed samples under same conditions involving same temperatures, treatment of samples, and solvents (n-hexane). Extracted oil samples were tested for the extraction yields of carotenes. Selenge shelterbelt, Uvs wild berry and Uvs shelterbelt cultivar seed samples contained 10.39, 7.7 and 9.25% (w/w) of oil, respectively. References revealed that the oil content from the all three samples are slightly lower when compared to study of seed oil (12.67%) of Seabukhthorn grown in Mongolian another province, Zavkhan [1] but oil content of seeds are in agreement with those reported by Kallio et al., [2] and Yang et al., [3] for the subspecies mongolica and rhamnoides. The results indicate that the oils from the seeds have different in carotenoids content. In accordance with the spectrophotometry analysis, the total carotenoid content was: 16.25mg/100g in Selenge, 16.61mg/100g in Uvs wild berry seed and 22.54 mg/100g for Uvs shelterbelt cultivar seabuckthorn seed oil samples.*

Keywords: sea buckthorn, total carotenoids,

1. INTRODUCTION

Sea buckthorn (*Hippophae rhamnoides* L.) is a hardy, deciduous shrub belonging to the family Elaeagnaceae [4]. The natural habitat of sea buckthorn extends widely in China, Mongolia, Russia, and most parts of Northern Europe. The distribution is from longitude 2–123°E and latitude 27–69°N and from 0 to 3300ma.s.l. Sea buckthorn has proven highly adaptable to extreme conditions, including temperatures ranging from − 43 to 40°C, drought, high altitudes, salinity, alkalinity, and inundation [5]. Because of its unique nutracuetical and anti soil-erosion property [6], Mongolia has put much effort to domesticate seabuckthorn and invested in planting sea buckthorn in the 2000s. Hippophae rhamnoides bears yellow or orange fruits that have been used for centuries in both Europe and Asia for food, therapeutic, and pharmaceutical purposes [7]. Seed of seabuckthorn is rich in vitamins, carotenoids, flavonoids, proteins, antioxidants, amino acids, essential fatty acids, and phytosterols [8]. The most valuable component of the berries and seed is in their oils. Both seeds and berry pulp have high lipid content, including tocopherols, tocotrienols, carotenoids, as well as omega-3 and omega-6 fatty acid families [9]. Many different carotenoids have been reported in various cultivars of sea buckthorn berries [10] including lutein zeaxanthin, cryptoxanthin, and beta-carotene [3]. Since carotenoids are powerful antioxidants and known to have physiologically beneficial effects in reducing the risk of certain cancers and in the prevention of age related macular degeneration, the potential of sea buckthorn oil as a nutraceutical and pharmaceutical ingredient is apparent [11]. Previous investigations have shown individual differences in chemical composition and content, which may be due to their genetic variability, climate and growing conditions, degree of ripening when harvested, storage conditions, parts of the plant and of the berry which is analyzed as well as the analytical methods used [12, 13, 14]. The main aim of this study was therefore to determine the oil extraction yield and total carotenoids in the soft parts of sea buckthorn seed grown in Mongolia.

2. METHODS

2.1 Materials

Berries of *Hippophae rhamnoides* (*H. r. subsp. Mongolica*) were collected from two different locations of Mongolia, Uvs (N 49°38', E 93 °16', Elevation: 931m) and Selenge (N 49°43', E 101°47', Elevation: 1256m) province, and stored at -20°C. Seeds were separated from frozen berries by pressing the juice and seeds were separated. Dried and millet seeds are used for oil extraction. All solvents used were of analytical grade. Beta-carotene standard purchased from Sigma-Aldrich (Swiss).

2.2 Extraction of oil

Powdered sample (5 g) of dried seeds was taken into the soxhlet apparatus. Extraction was carried out with *n*-Hexane for 6 hours without interruption by heating around 60 to 70°C. After the extraction over, solvent was evaporated in the rotary evaporator (Heidolf, Germany) with vacuum pump (Welch, USA) until no color of solvent remains and finally oil was collected in a separate beaker for further analysis.

2.3 Total amounts of carotenoids determination

Total amount of carotenoids were determined following the modified method by Gao et al. (2000) [15]. Solutions of oil in hexane (0.1 g/10 mL) were measured at 450 nm in the spectrophotometer (UNICO 7200 Spectrophotometer, P.R.China). Quantification of the amounts of carotenoids were based on calibration with beta-carotene standard and amounts of carotenoids were expressed in mg/100 g of oil.

3. RESULTS AND DISCUSSION

Seed extracted from Selenge shelterbelt cultivar, Uvs wild berry and Uvs shelterbelt cultivar seed samples contained 10.39, 7.7 and 9.25 percent of oil, respectively. In this experiment, *n*-Hexane was used for oil extraction. The results clearly indicate that the recovery of the Seabuckthorn oil from these regions especially Uvs wild grown berry seed are low when compared to other two samples and other study of seed oil of Seabukhthorn grown in Zavkhan province, Mongolia [1].

Results of lipid content of seeds are in agreement with those reported by Kallio *et al.,* [2] and Yang *et al*., [3] for the subspecies Mongolia and remodels. In accordance with the spectrophotometry analysis, the total carotenoid content was: 16.25 mg/100g in Selenge, 22.54 mg/100g in Uvs Tes and 16.61 mg/100g for Uvs Ulaangom seabuckthorn seed oil samples. Our results agree with data from other source of literature [16]. The results indicate that the oils from the seeds have different in carotenoids content. The seed oil yield of Uvs shelterbelt cultivar is relatively low than other two sample but total carotenoid content was higher. Total seabuckthorn seed carotenoid contents of two samples were indicated to be particularly lower if compared to other studies [17, 18].

However, a thorough investigation must be focused on selection of sub species, agro climatic conditions, harvesting time to obtain maximum yield of Seabuckthorn oil and higher level of carotenoid.

4. CONCLUSION

Seed oil in Sea buckthorn (*Hippophae rhamnoides L.)* of Mongolia were analyzed to determine oil content, and carotenoid composition. The total carotenoid contents in the seabuckthorn seed oil of Uvs wild berry, Uvs shelterbelt cultivar and Selenge shelterbelt cultivars were 16.61 mg/100g, 22.54 mg/100g and 16.61 mg/100g of oil, respectively.

4. ACKNOWLEDGEMENT

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