Investigation of phenolic content, antioxidant capacity and pomological characterisation of wild sea buckthorn (*Hippophae rhamnoides L.*) from the walnut-fruit forest of Kyrgyzstan

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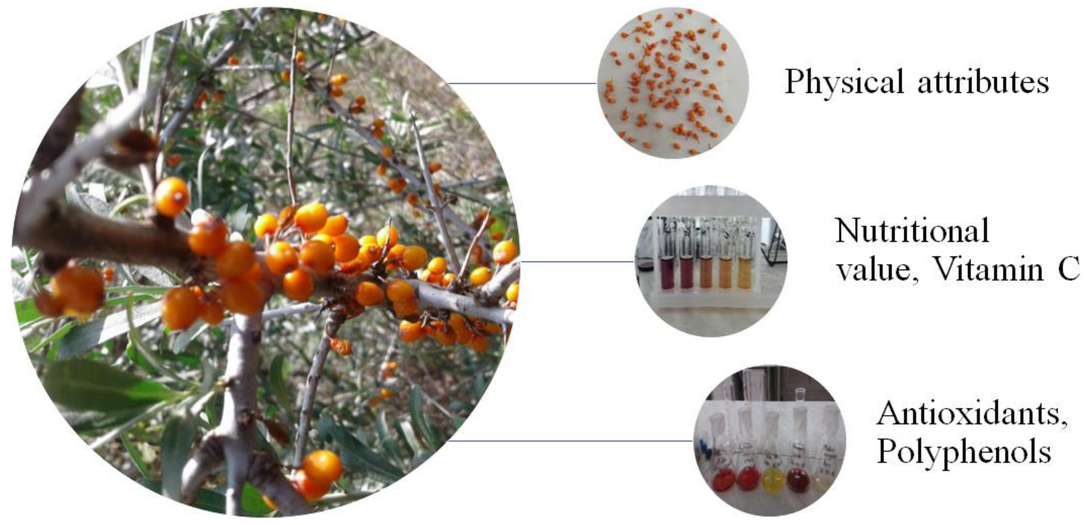
1. Introduction

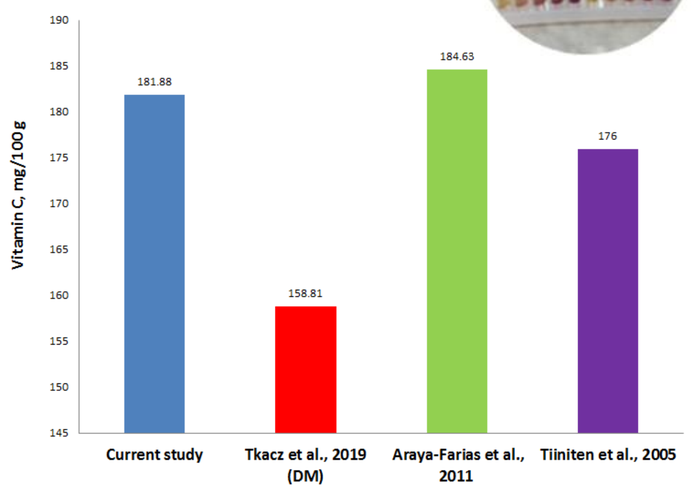
- Sea buckthorn (*Hippophae rhamnoides L.*) is a branched, thorny shrub, drought- and cold-resistant;
- widely used for soil, water, and wildlife conservation and anti-desertification purposes (4).
- All parts of the sea buckthorn contain: ***flavonoids, phenolic compounds, tocopherols, fatty, and organic acids, fats, vitamins (A, E, K, C, B1, and B2), amino acids, terpenes, tannins, and microelements*** (3).
- The natural and climatic conditions of Kyrgyzstan make it possible to grow sea buckthorn.
- Information about the bioactive compounds, the antioxidant activity of sea buckthorn from walnut-fruit forest of Kyrgyzstan is very limited in the scientific literature.

2. Methods and materials

The wild sea buckthorn berries were collected from the natural walnut-fruit forests in the communities of Arslanbob (N 41°22'8.33", E 72°3'45.974", Altitude: 1300 m) and Kyzyl-Unkur (N 41°18'20.903", E 72°57'48.209", Altitude: 1466 m) in September 2017.



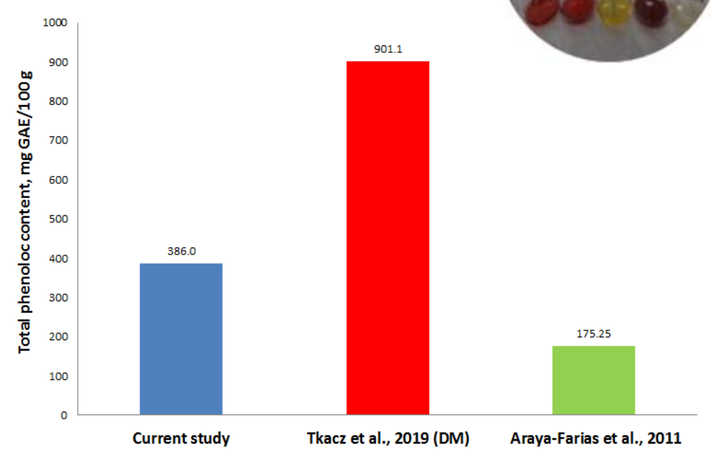
3.1 Content of vitamin C



3.2 Chemical composition of fresh sea buckthorn

Index	Kyrgyzstan, Kyzyl-Unkur	Other literature sources
Moisture content, g/100 g	66.03 ± 0.15	58.7 (Chauhan et al., 2001) 67.2-76.9 (Ranjith et al., 2006) 88.22 - 86.92 (Tiitinen et al., 2005) 84.2 - 87.4 (Sytařová et al., 2020)
Invert sugars, g/100 g	1.03 ± 0.05	1.34 - 2.87 (Tiitinen et al., 2005)
pH	3.23 ± 0.00	2.7 - 2.9 (Tiitinen et al., 2005) 2.63 - 2.98 (Ercisli et al., 2007)
Titratable acidity, g malic acid/100 g	1.95 ± 0.11	2.0 - 3.7 (Tiitinen et al., 2005). 2.64 -4.54 (Ercisli et al., 2007)
Total crude fibre, g/100 g	12.13 ± 0.66	
Ash content, g/100 g	1.75 ± 0.04	0.26 -1.05 (Ranjith et al., 2006) 0.31 - 0.43 (Tkacz et al., 2019) 1.8 (Chauhan et al., 2001).
Sugar/acid ratio	0.52	0.40-2.99 (Tkacz et al., 2019) 0.4-1.9 (Tiitinen et al., 2005)

3.3 Total polyphenol content



3.4 Physical attributes of sea buckthorn

- Average length (D_{max}) 6.36 mm,
- Average width (D_{in}) 4.7 mm,
- Thickness (D_{min}) 4.6 mm,
- Sphericity 81%,
- Surface area at the natural moisture content of 66.03 % by weight basis (w.b.)
- The solid density (ρ_s) of the fresh samples was 1.05 g/cm^3.
- The surface area of the fruits was equal to 70.06 mm^2.

The physical parameters of sea buckthorn from the trans-Himalayan region (Yadav et al. 2006; Jaiswal et al. 2017) and Turkey are compared (Sezen et al. 2015). The Kyrgyz sea buckthorn has physical parameters nearly to sea buckthorn genotypes from Himalaya.

4. Conclusion

- The physical attributes and chemical composition, also bioactive components such as vitamin C and phenolic compounds of wild sea buckthorn (*Hippophae rhamnoides L.*) of the Kyrgyz walnut-fruit forests were determined for the first time.
- The results were compared with all available data of other researchers as documented in the scientific literature.
- Moisture content of sea buckthorn is significantly lower than in berries from Europe but higher than Indian sea buckthorn.
- Total phenolic and vitamin C content of Kyrgyz sea buckthorn is high.
- The antioxidant activity IC50 in ethanol extract was measured as 3.8 µg/ml.
- Further research is needed for the development of post-harvest technology of sea buckthorn.
- An integrated approach of science and business for the growing more productive sea buckthorn genotypes is needed.

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