Volatile Constituents and *In Vitro* Antioxidant and Antityrosinase Activities of the *Prangos munzurensis* Fruits and Roots Essential Oils

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Introduction

One of the targets in skin health/beauty is tyrosinase which plays efficient role in melanin biosynthesis. Tyrosinase is the key rate-limiting enzyme of conversion of L-tyrosine to dopaquinone via L-DOPA, and so, influences melanin biosynthesis in melanocytes. Among secondary metabolites identified in medicinal and aromatic plants, essential oils have gained more attraction for cosmetic industry. Prangos species belonging to the Apiaceae family are mainly rich in essential oils. In this study we aimed to isolate the essential oil of *Prangos munzurensis* fruits and roots, and determine the volatile composition and their antioxidant and antityrosinase activities.

Materials and Methods

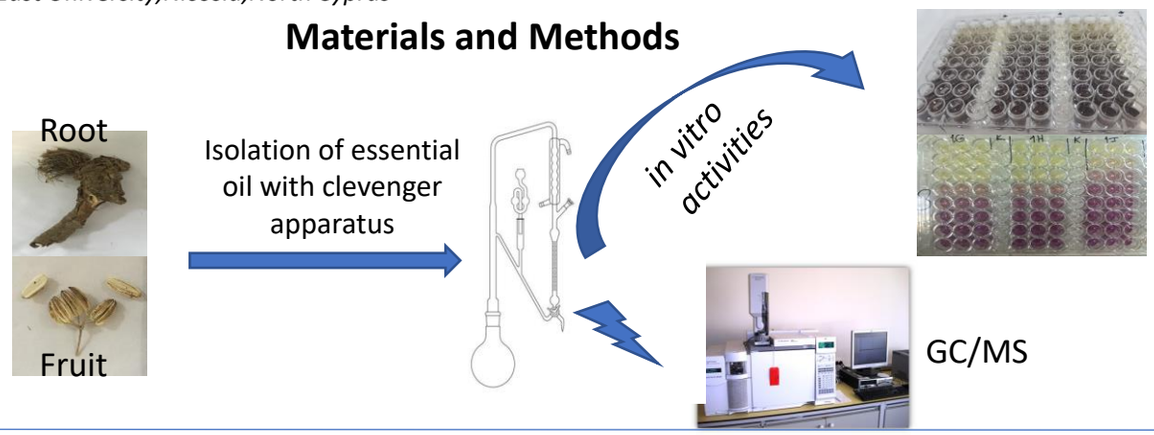

Table 1. The Composition of the Essential Oils of *Prangos munzurensis*

RRI	Compounds	% Fruit	% Root	IM
1032	α-Pinene	8.6	-	t_R, MS
1159	δ-3-Carene	0.6	-	t_R, MS
1174	Myrcene	1.6	-	t_R, MS
1203	Limonene	0.5	-	t_R, MS
1213	β-Phellandrene	0.8	-	t_R, MS
1246	(*Z*)-β-Ocimene	-	6.6	t_R, MS
1255	γ-Terpinene	10.3	-	t_R, MS
1296	Octanal	-	1.3	t_R, MS
1538	*trans*-Chrysanthenyl acetate	11.0	5.2	MS
1591	Bornyl acetate	-	0.7	t_R, MS
1645	*cis*-Verbenyl acetate	0.5	-	t_R, MS
1655	(*E*)-2-Decenal	-	4.2	MS
1656	Chrysanthenyl isobutyrate	-	25.8	MS
1668	*cis*-Verbenol	1.9	-	MS
1684	*trans*-Verbenol	6.6	-	MS
1726	Germacrene D	0.7	-	MS
1745	**Unknown 1**	11.4	-	-
1747	p-Mentha-1,5-dien-8-ol	3.3	-	MS
1751	Bicyclogermacrene	1.0	-	t_R, MS
1755	Chrysanthenyl isovalerate II	0.6	-	MS
1755	(*Z*)-γ-Bisabolene	-	3.4	MS
1773	δ-Cadinene	0.6	-	t_R, MS
1827	(*E*,*E*)-2,4-Decadienal	-	1.8	MS
1853	Germacrene B	0.5	-	MS
1855	**Unknown 2**	2.0	12.0	-
1925	2,3,4-Trimethyl benzaldehyde	4.4	-	MS
2019	2,3,6-Trimethylbenzaldehyde	29.7	16.2	MS
2144	Spathulenol	0.9	1.5	t_R, MS
2239	Carvacrol	-	1.2	t_R, MS
2255	α-Cadinol	0.7	-	t_R, MS
2300	Tricosane	-	1.6	t_R, MS
2931	Hexadecanoic acid	-	17.1	MS
	Monoterpene hydrocarbons	22.4	6.6	
	Oxygenated monoterpenes	11.8	1.9	
	Sesquiterpene hydrocarbons	2.8	3.4	
	Oxygenated sesquiterpenes	2.2	1.5	
	Other compounds	45.6	73.2	
	Total %	**98.2**	**98.6**	

Results and Discussion

- ✓ In the oil obtained from the fruits and the roots, 22 compounds were identified representing 98.2 % and 14 compounds were identified representing 98.6 % of the volatile compounds, respectively (Table 1).
- ✓ The essential oil yield of the fruits was calculated as 1.52 %. Essential oil from the roots were obtained in trace amounts and dissolved in *n*-hexane for the separation of the water phase after hydrodistillation. The major compounds in the fruit essential oil were identified as 2,3,6-trimethylbenzene (29.7 %), *trans*-Chrysanthenyl acetate (11.0 %), unknown-1 (11.4 %), γ- terpinene (10.3 %), α-pinene (8.6 %) and *trans*-verbenol (6.6 %), respectively. In the root essential oil, chrysanthenyl isobutyrate (25.8 %), hexadecanoic acid (17.1%), 2,3,6-trimethyl benzaldehyde (16.2 %), unknown-2 (12.0 %), (*Z*)-β-ocimene (6.6 %) and *trans*-Chrysanthenyl acetate (5.2 %) were identified as major constituents.
- ✓ An unknown compound 1 with bp 71(*m/z* 222[M^+], 70eV, *m/z* (rel int.): 71(100), 119(56), 43(42), 134(28), 109(17), 91(15), 81(10)) in high percentage was detected in samples A (11.4%).
- ✓ An unknown compound 2 with bp 99 (*m/z* 250[M^+], 70eV, *m/z* (rel int.): 99(100), 71(57), 119(54), 43(46), 134(30), 91(14), 109 (14), 81(9), 55(9)) in high percentages was detected in samples A and B (2.0% and 12.0% resp.).

In vitro activities

Table 2. DPPH radical svavenging and tyrosinase inhibitory activities of *Prangos munzurensis* fruits essential oil

	DPPH (IC_{50}) (mg/mL)	Tyrosinase (% inhibition)
Fruit EO	5.14 ± 0.14	22.25 ± 0.26
Vit C.	9.3 ± 0.01 µg/mL	-
Kojic acid	-	3.6 ± 0.01 µg/mL (IC_{50})

Fruit essential oil showed DPPH radical scavenging activity with the IC_{50} value 5.14 ± 0.14 mg/mL and inhibited tyrosinase 22.25 ± 0.26 % at 1 mg/mL concentration.

Conclusions

Essential oil compositions of *Prangos munzurensis* fruits and roots were analyzed with a GC-MS system. To the best of our knowledge, DPPH radical scavenging activity and tyrosinase inhibition of *Prangos munzurensis* fruit and root essential oils and their volatile compositions were evaluated for the first time.