

## Introduction:

*Viscum album* L. (Loranthaceae Juss.) is semi-parasitic evergreen shrub distributed in Europe, northwestern part of Africa and Anatolia. The species is hosted by different woody gymnosperm and angiosperm species and it is known that host preference usually reflects in differences in morphological traits and possibly in phytochemical composition. Therefore, there are different subspecies, out of three subspecies (*V. album* subsp. *abietis* (Wiesb.) Janchen, subsp. *creticum* N. Böhling & al. and subsp. *austriacum* (Wiesb.) Vollm.) occur most frequently on conifers while subsp. *album* is confined to deciduous host trees and shrubs. In addition to religious and mystical uses, the mistletoe is used in the folk medicine for circulatory and respiratory disorders and as an anticancer remedy.

## Objectives:

The main object of this research was to examine and compare biological materials obtained from two different subspecies of *V. album* (*V. album* subsp. *abietis* labeled as S1 and *V. album* subsp. *album* labeled as S2 sample) as potential source of the total phenolics, total flavonoids and total dihydroxycinnamic acid derivatives. For that purpose the ethanolic extracts were prepared and were analyzed for their antioxidant properties.

## Material and methods:

Extraction of plant material (shoot) was performed using 70% ethanol. The content of selected phytochemicals was determined by application of the standard spectrophotometric methods: Folin-Ciocalteu (total phenolics, TPC), aluminum chloride (total flavonoids, TFC) and Arnov's (total dihydroxycinnamic acid derivatives, HCA) and expressed as mg/g equivalents of gallic acid (GAE), quercetin (QE) and chlorogenic acid (CGAE) calculated on fresh weight (F.W.) of sample respectively. For determination of antioxidant properties the following *in vitro* assays were used: total antioxidant capacity (TAC) determined via phosphomolybdenum test, ferric reducing power (FRP) and cupric reducing antioxidant activity (CUPRAC) as well as DPPH radical quenching ability. All results for antioxidant analyses were expressed as mg/g of ascorbic acid equivalents (AAE) per gram of F.W. To investigate differences between two *V. album* subspecies the Student's *t*-test with a significance level of  $p \leq 0.05$  was performed. All measurements were carried out in triplicate.



*Viscum album* subsp. *abietis*

*Viscum album* subsp. *album*

EXTRACTION (70% ETHANOL)

TPC  
TFC  
HCA  
CUPRAC  
TAC  
DPPH  
FRP

RESULTS

Parameters	<i>Viscum album</i> subsp. <i>abietis</i>	<i>Viscum album</i> subsp. <i>album</i>	p value
TPC	5.41±0.37	7.69±0.08	<0.001
TFC	8.27±0.75	6.84±0.12	0.071
HCA	11.98±0.02	14.33±0.84	<0.001
CUPRAC	2.29±0.09	2.37±0.68	0.702
TAC	78.86±2.30	237.61±4.68	<0.001
DPPH	13.14±0.10	14.86±4.33	0.002
FRP	16.45±0.21	21.64±0.26	<0.001

## Results:

It was observed that results for TPC (5.41 mg/g GAE for S1; 7.69 mg/g GAE for S2), HCA (11.98 mg/g GAE for S1; 14.33 mg/g CGAE for S2), TAC (78.86 mg/g AAE for S1; 237.61 mg/g AAE for S2), FRP (16.45 mg/g AAE for S1; 21.64 mg/g AAE for S2) and DPPH\* (13.14 mg/g AAE for S1; 14.86 mg/g AAE for S2) were significantly different ( $p \leq 0.05$ ). In all cases *V. album* subsp. *album* exhibited better bioactivity compared to *V. album* subsp. *abietis*. However, *V. album* subsp. *abietis* exhibited higher TFC value (8.27 mg/g QE F.W.) but it was not significantly different. The CUPRAC values didn't differ much in two studied subspecies.

## Conclusions:

Obtained results indicate that both mistletoe subspecies are good source of bioactive compounds, in particular, the different phenolic acids. Both subspecies are the excellent antioxidant source. The further research will be focused on deeper phytochemical characterization of different *Viscum* populations and the bioactivity of target extracts and their individual components.