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The effects from the accumulation of toxic trace elements are very complex and can influence the content of pharmacologically active compounds in plants. Thus significantly changes the quality, safety and efficiency of their natural plant products. We have noticed before that Macedonian companies have export of a good quality raw material to processing and import of final products with added value¹. Because we are suspicious of pharmacological and toxicological point of view we decided on the research of 15 local brands of various teas which could be found in the markets in Macedonia.



Experimental

Toxic heavy metals (Cd, Pb) were analyzed by ETAAS, and other elements were analyzed by FIMS (Hg) and FIAS (As) methods, respectively.

The investigated teas were as follows:

Tea sample	Local brands
<i>Cynosbati fructus</i>	PRODIS DOO
<i>Menthae piperitae folium</i>	PRODIS DOO
<i>Serpylli herba</i>	PRODIS DOO
<i>Tiliae flos</i>	PRODIS DOO
<i>Chamomilae flos</i>	PRODIS DOO
Green tea	PRODIS DOO
<i>Urticae folium</i>	PRODIS DOO
<i>Origani vulgaris herba</i>	PRODIS DOO
<i>Origani vulgaris herba</i>	ALKALOID AD
<i>Chamomilae flos</i>	ALKALOID AD
<i>Serpylli herba</i>	KORO TEA
<i>Tiliae flos</i>	ALKALOID AD
<i>Serpylli herba</i>	ALKALOID AD
<i>Menthae piperitae folium</i>	ALKALOID AD
<i>Urticae folium</i>	ALKALOID AD

Results

Table 1 Concentration of some trace elements (mg/mg dry mass)

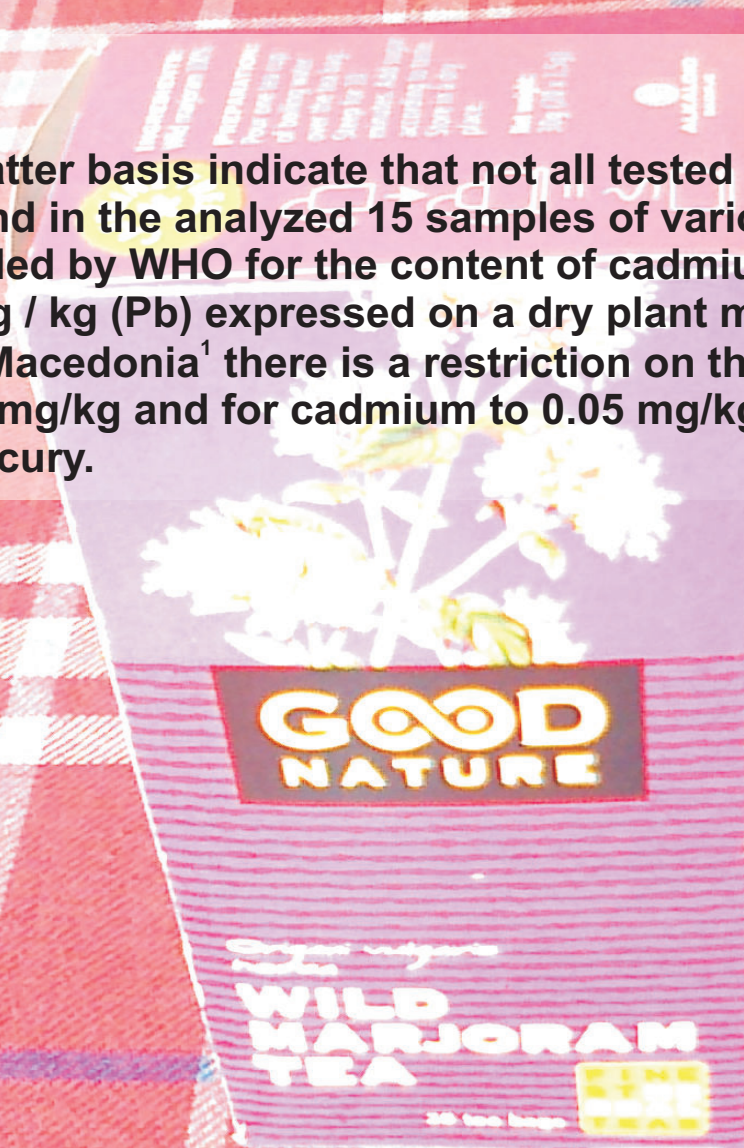
Tea sample	Local brands	Pb	Cd	As	Hg
<i>Cynosbati fructus</i>	PRODIS DOO	0.034	0.037	0.050	0.166
<i>Menthae piperitae folium</i>	PRODIS DOO	0.632	0.125	0.332	0.115
<i>Serpylli herba</i>	PRODIS DOO	0.840	0.259	0.696	0.070
<i>Tiliae flos</i>	PRODIS DOO	0.605	0.077	0.077	0.193
<i>Chamomilae flos</i>	PRODIS DOO	0.069	0.594	0.073	0
Green tea	PRODIS DOO	1.830	0.085	0	0.036
<i>Urticae folium</i>	PRODIS DOO	0.460	0.006	0.196	0.163
<i>Origani vulgaris herba</i>	PRODIS DOO	0.124	0.512	0	0.069
<i>Origani vulgaris herba</i>	ALKALOID AD	0.063	0.039	0	0.096
<i>Chamomilae flos</i>	ALKALOID AD	0.442	0.444	0	0
<i>Serpylli herba</i>	KORO TEA	1.087	0.185	0	0.113
<i>Tiliae flos</i>	ALKALOID AD	0.447	0.063	0	0
<i>Serpylli herba</i>	ALKALOID AD	2.396	0.116	0.062	0.033
<i>Menthae piperitae folium</i>	ALKALOID AD	0.179	0.028	0.009	0.828
<i>Urticae folium</i>	ALKALOID AD	0.364	0.004	0	0.485

Discussion

Results expressed on dry matter basis indicate that not all tested trace elements: lead, cadmium, mercury and arsenic are found in the analyzed 15 samples of various teas.

Permissible limit recommended by WHO for the content of cadmium and lead in medicinal plants is 0,3 mg / kg (Cd) and 10 mg / kg (Pb) expressed on a dry plant matter.

Under current legislation in Macedonia¹ there is a restriction on the maximum allowable concentration for lead to 0.1 mg/kg and for cadmium to 0.05 mg/kg expressed on fresh herbs and no limits for arsenic and mercury.





Conclusion

Unfortunately not all of the 15 local brands of various teas which could be found in the markets in Macedonia are safe to use.



References

¹AGBIZ MARKET INFORMATION. (2009): „Wild gathered products” Newsletter, 2., 2-4.

²Pravilnik za opшти baranja za bezbednost na hrana, Sl. Vesnik RM 118/05.