Foods 2024 Conference

The 5th International Electronic Conference on Foods

28–30 October 2024 | Online

MDPI

# ELEMENTAL IMPURITIES IN SOY ISOFLAVONE FOOD SUPPLEMENTS

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## INTRODUCTION & AIM

**Toxic metal(loid)s** are commonly suspected impurities in food supplements, especially herbal ones.

This study aimed to analyze toxic metal(loid)s presence in **soy isoflavone supplements.**

## METHOD

Soy isoflavone supplements, represented by 21 products collected in the central Balkan countries (Serbia, Bosna and Hercegovina, Croatia), were tested by **inductively coupled plasma mass spectrometry** technique after microwave digestion. The performance of the analytical method was monitored by the analyses of certified reference materials, as well as by the regular participation of an accredited laboratory in proficiency testing.

## RESULTS & DISCUSSION

Elemental profiles: **23 elements**

18 detected in more than half of the products

Extremely variable concentrations (Sr, Fe, Zn: > 3 orders of magnitude)

Classification of elements - ***ICH Guidelines for Elemental Impurities***:

**Class 1** *(systemic toxicants causing multiple organ injuries/failure; limited/no use production of pharmaceuticals)*:

As (91%), Pb (77%) and Cd (68%) showed significantly higher occurrence than Hg (41%). The highest concentrations of elements covered by Regulation 2023/915 complied with the maximum allowed (Pb 0.30 vs. 3.0 mg/kg, Cd 0.38 vs. 1.0 mg/kg, Hg 0.08 vs. 0.10 mg/kg).

**Class 2A** *(route-dependent toxicants; high probability of occurrence)*:

Co, V, and Ni, were found in all samples, in concentrations up to 1.37, 0.65 and 2.58 mg/kg, respectively.

**Class 2B** *(route-dependent toxicants; low probability of occurrence)*:

Se and Tl were rarely detected.

**Class 3** *(low oral toxicity)*:

Ba and Cu were found in all and Cr in all but one supplement, Sb in half and Sn in none.

**Non-classified** *(low inherent toxicity)*: Te, Be and Sr were detected.

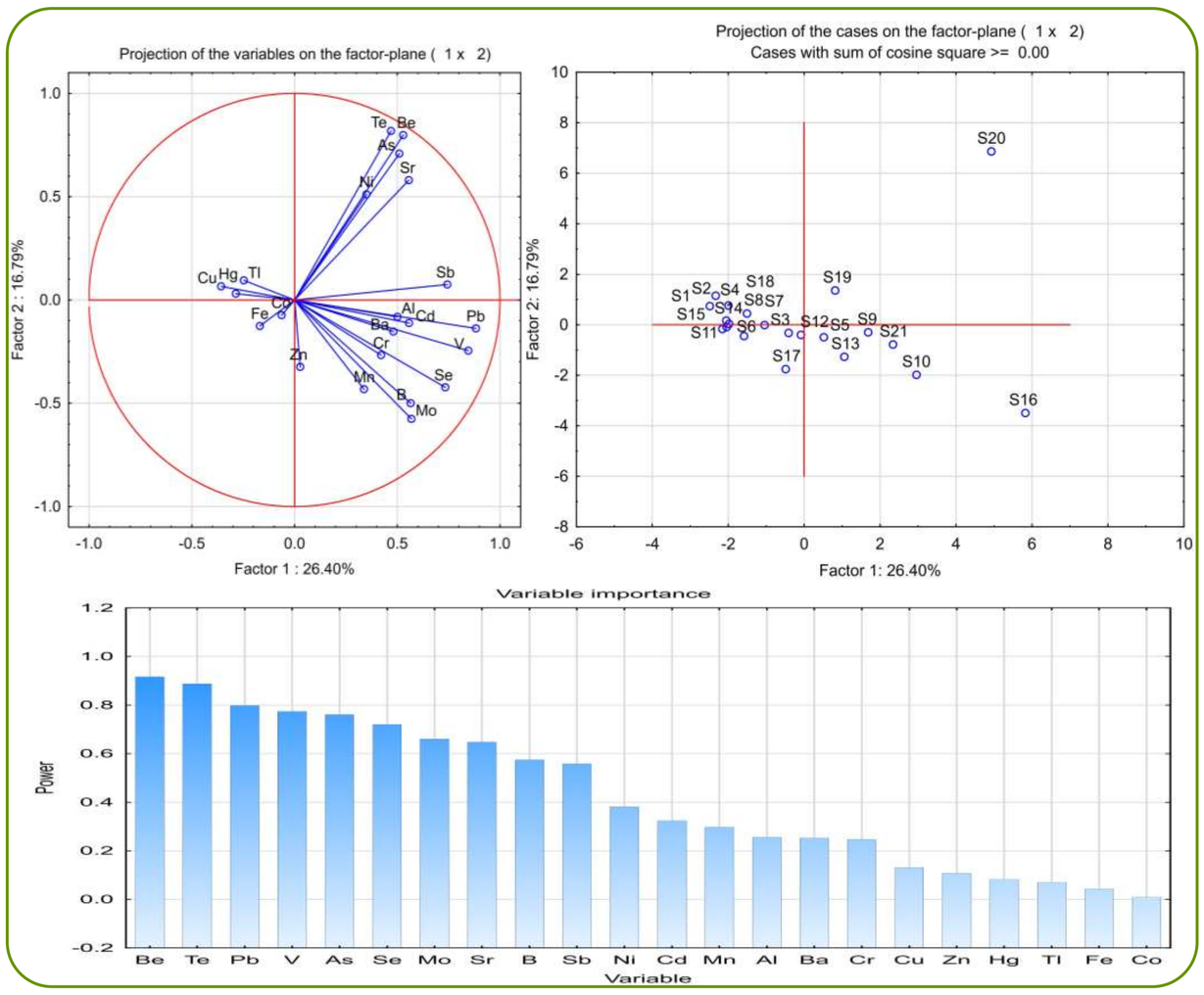


**Figure 2.** Principal componenet analysis




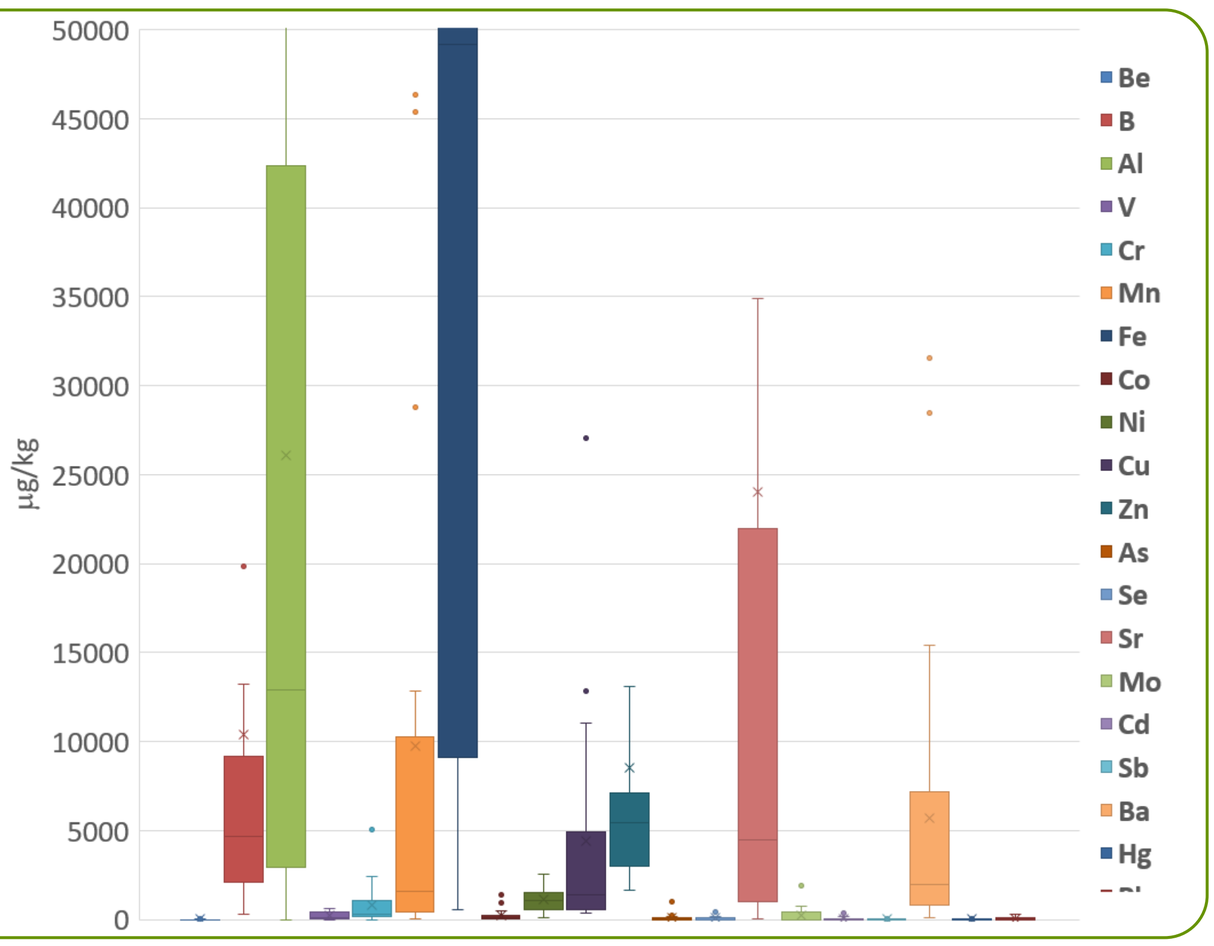


**Figure 1**. (A) Box-Whisker concentration plot (µg/kg) of toxic metal(loid)s in soy-based supplements (Sn not detected in any sample, Te and Tl not shown due to low frequency of occurrence (1 and 2 samples, respectively)); (B) enlarged plot: y-axis to 50000 µg/kg (whiskers from min to max, □ interquatile range, – median, × mean)

## CONCLUSION

Considering that toxic metal(loid)s can pose a serious concern for the health of consumers, the sources of such impurities (raw materials, production equipment, etc.) should be strictly controlled.

## FUTURE WORK / REFERENCES

Assessment of human health risk of toxic metal(loid)s exposure through soy supplements.