

Monitoring heavy metals in paddy fields and rice products in the Mekong Delta region

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Introduction

To ensure organic rice production, levels of heavy metals in paddy fields should be strictly evaluated as a prerequisite, as heavy metals such as As, Cd and Pb are often of concern in the rice products. Therefore, we conducted field sampling of paddy soil, water (including irrigation water), and collected rice grains (both polished and unpolished) from both conventional and organic rice production fields in Vinh Long, Dong Thap and An Giang provinces to evaluate the heavy metals status in the Mekong Delta region.

Results

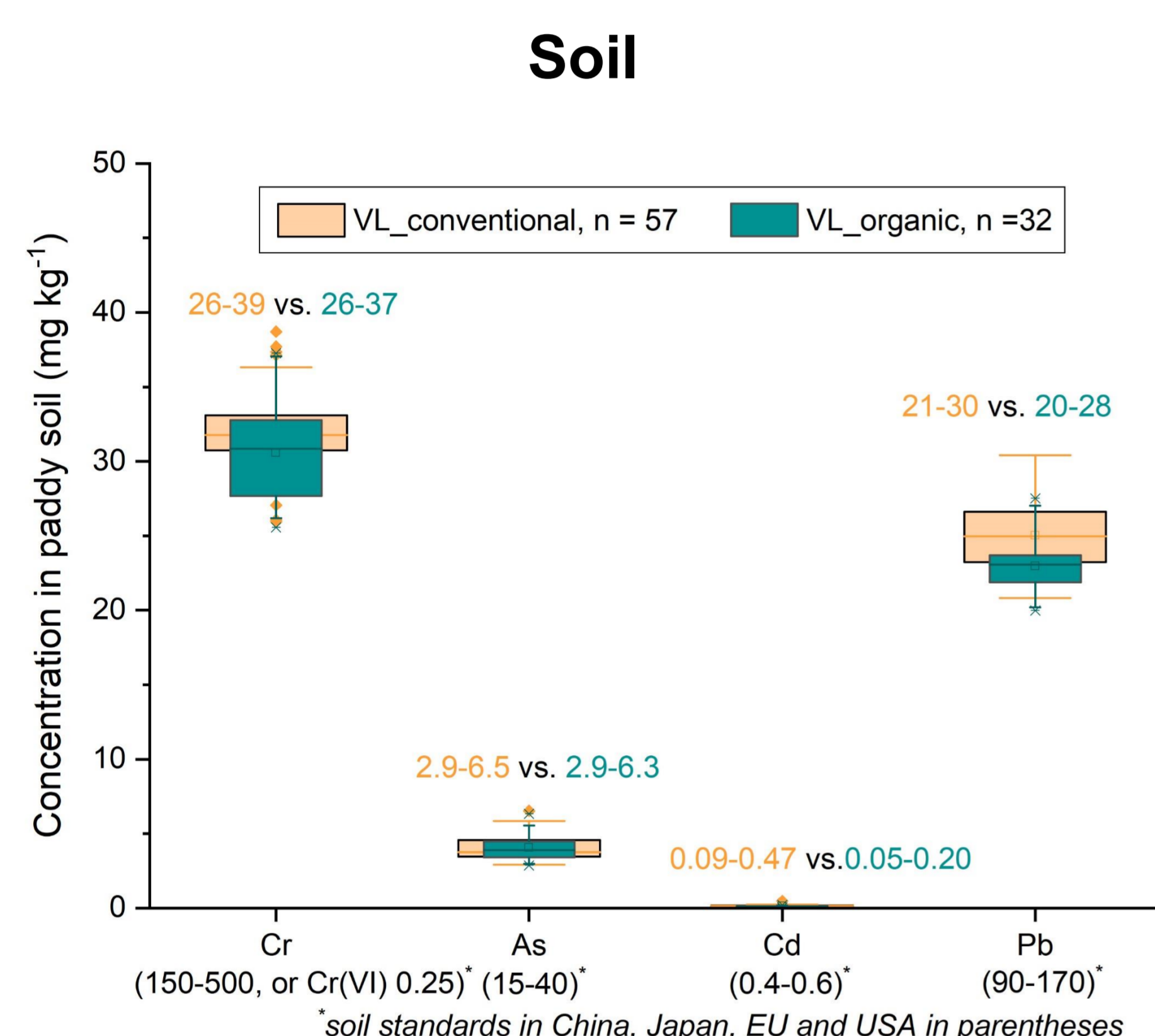


Figure 1. Concentration of heavy metals of interest in the soil of conventional (C) and organic (O) paddy fields in Vinh Long Province

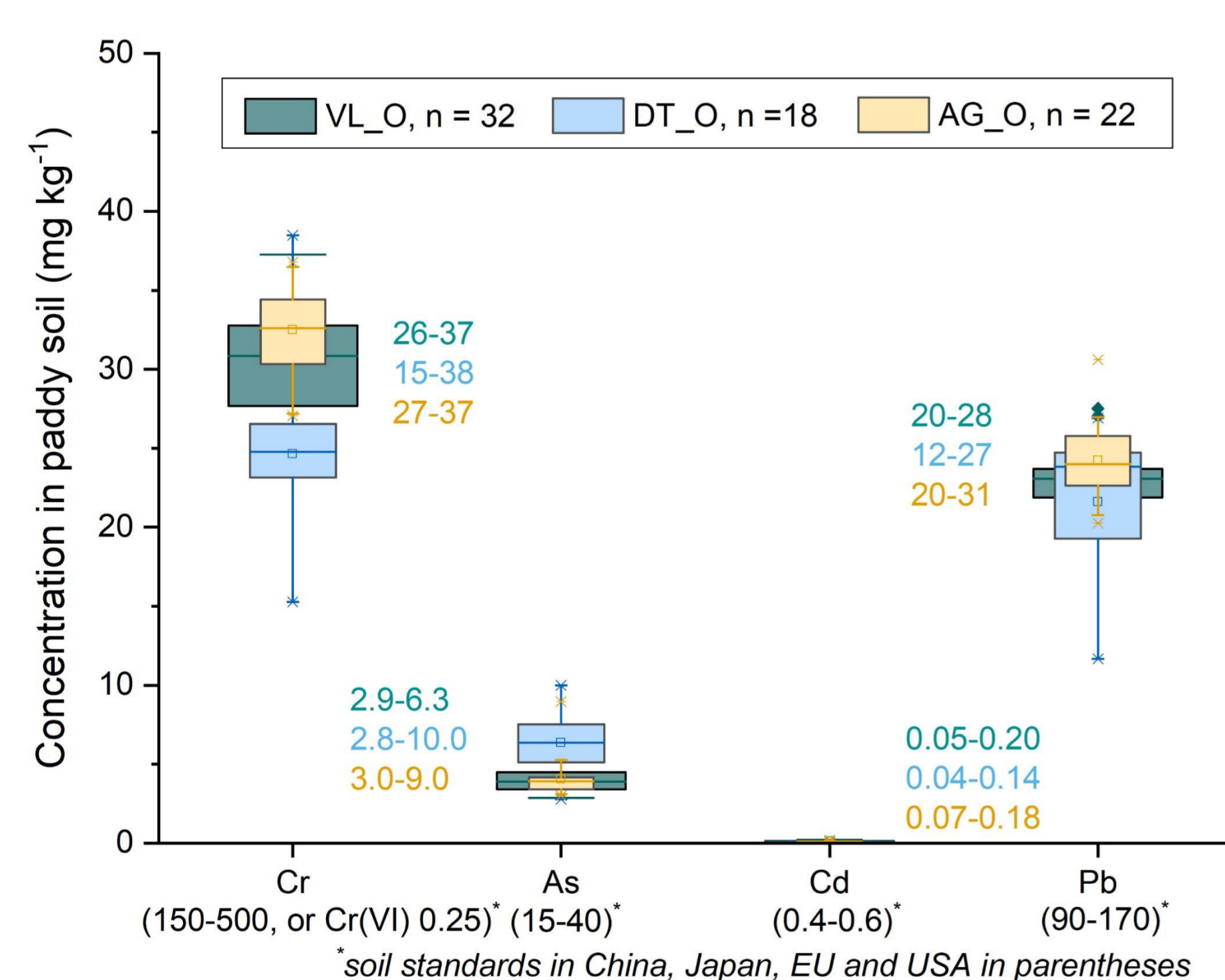


Figure 2. Concentration of heavy metals of interest in the soil of organic paddy fields in Vinh Long (VL_O), Dong Thap (DT_O), and An Giang (AG_O) Provinces

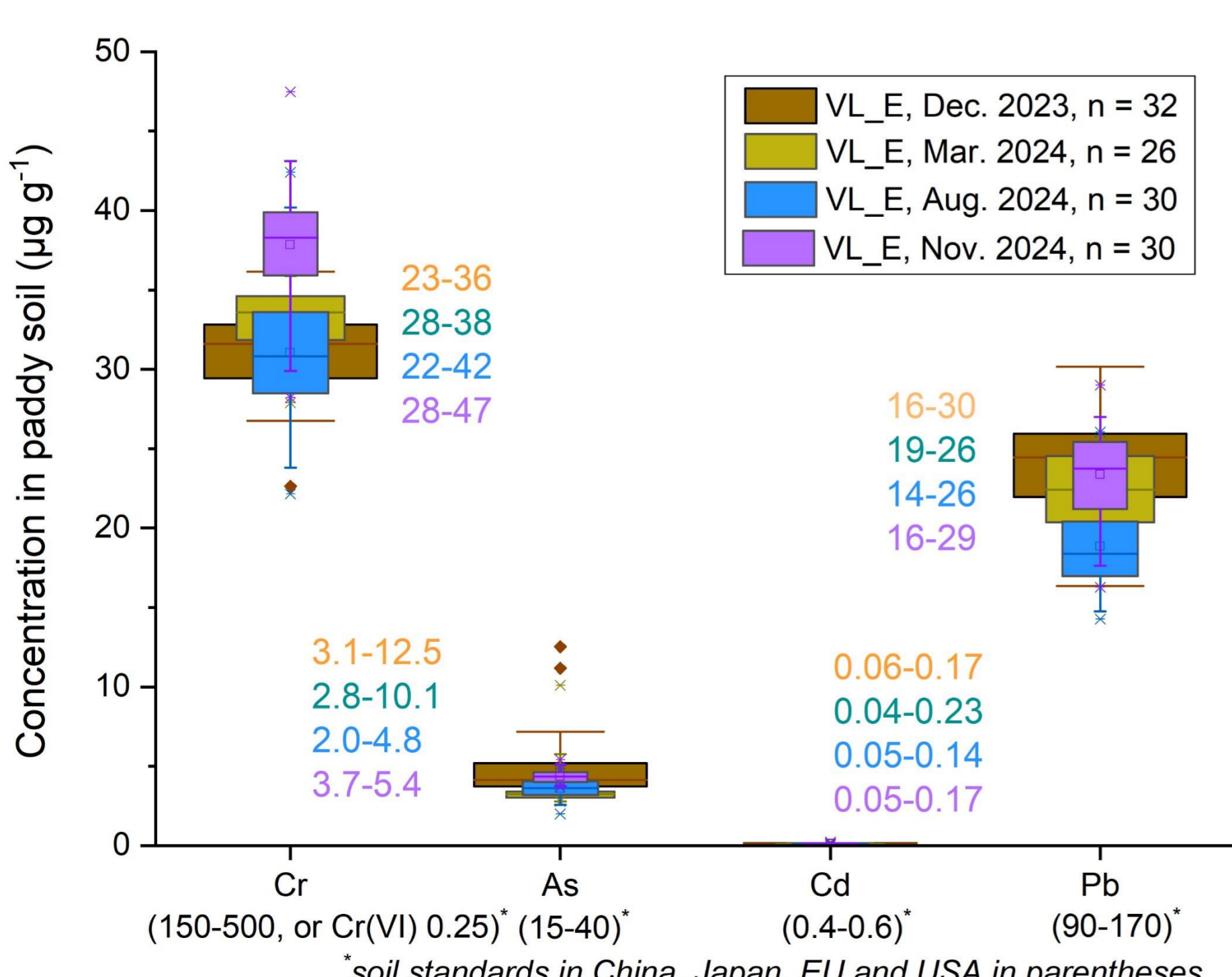


Figure 3. Concentration of heavy metals of interest in the soil of the experimental paddy fields of this project in Vinh Long Province

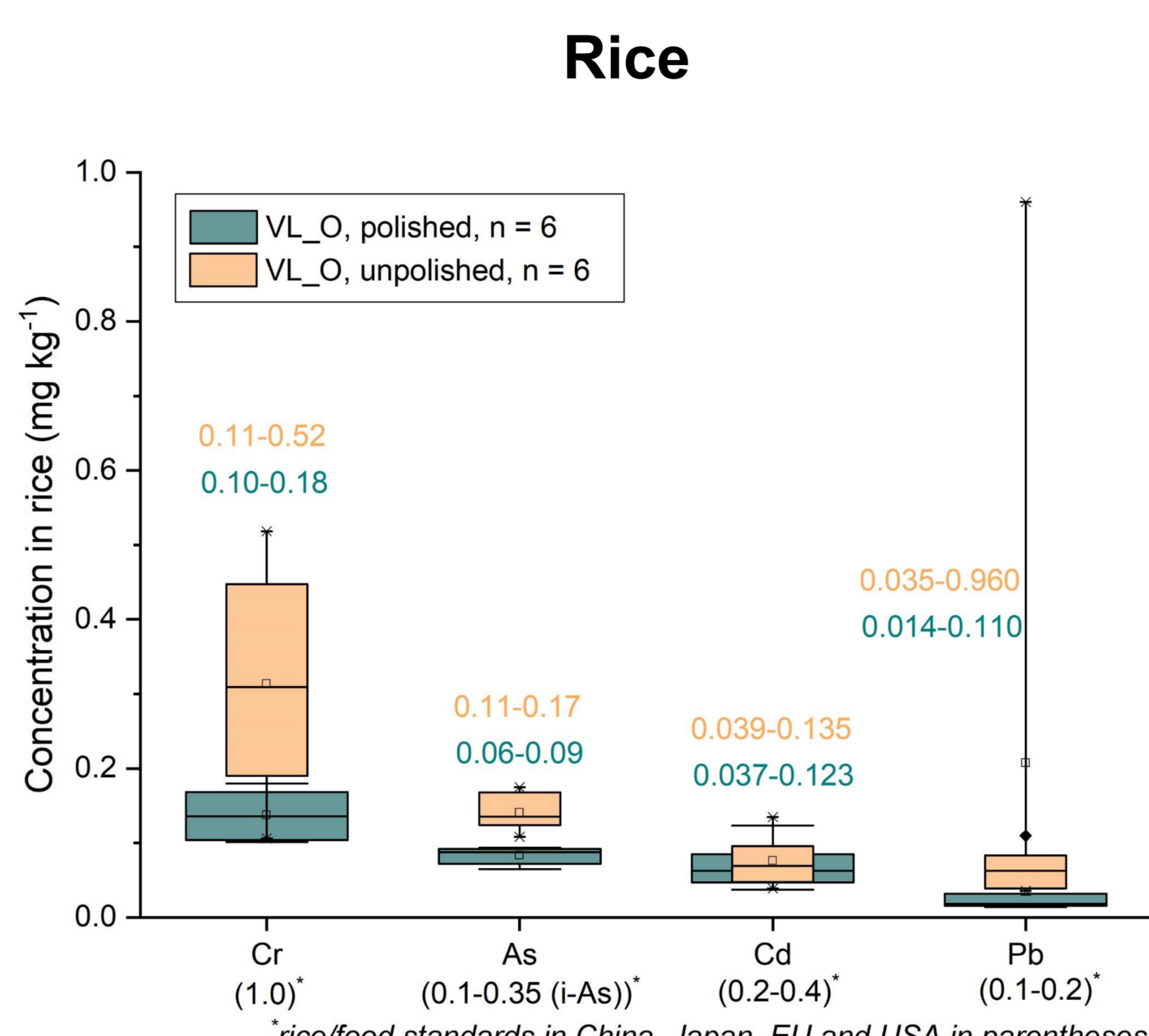


Figure 4. Concentration of heavy metals of interest in the rice products from organic paddy fields in Vinh Long Province

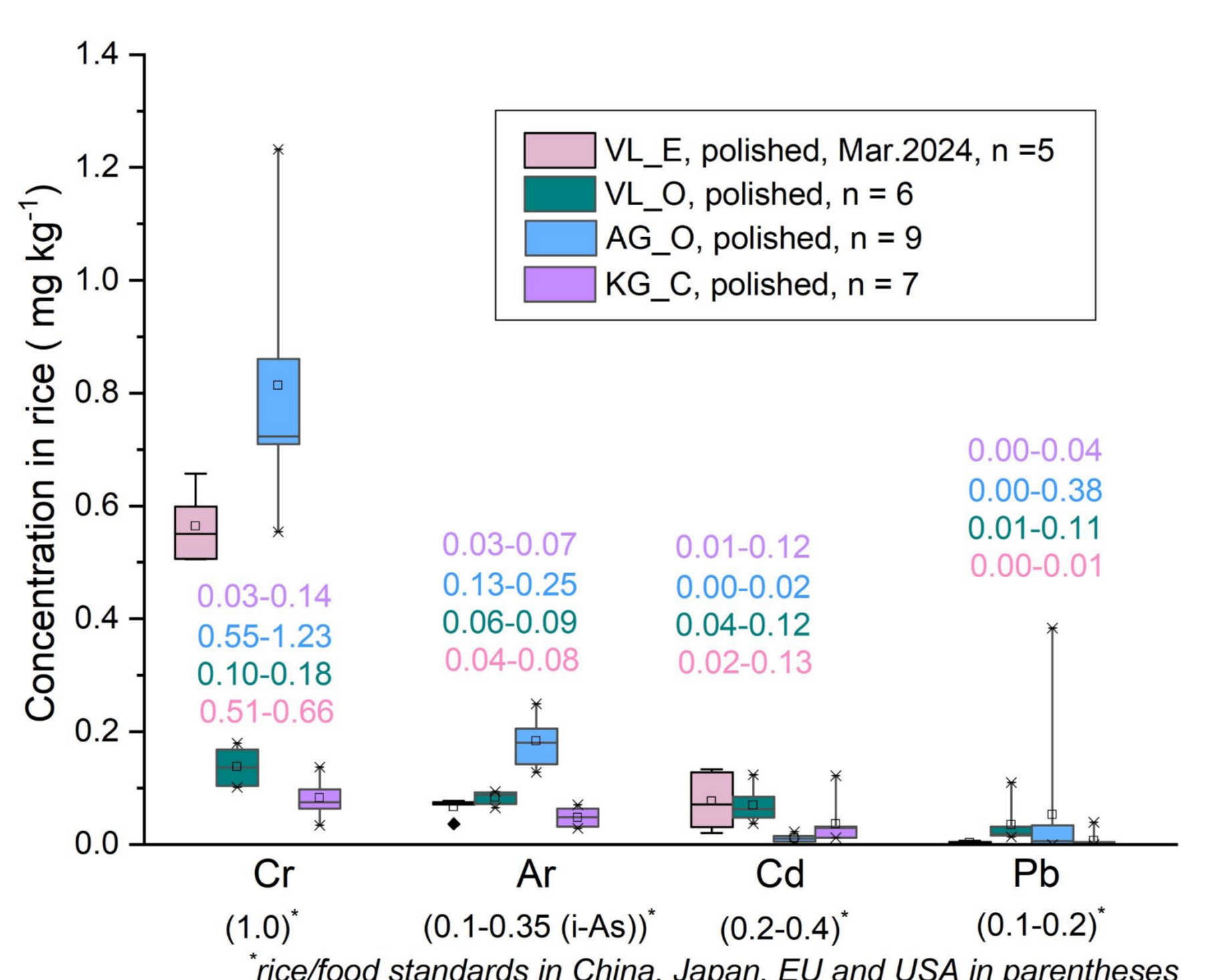


Figure 5. Concentration of heavy metals of interest in polished rice grains from conventional or organic paddy fields in Vinh Long (VL_E, VL_O), An Giang (AG_O), and Kien Giang (KG_C) Provinces

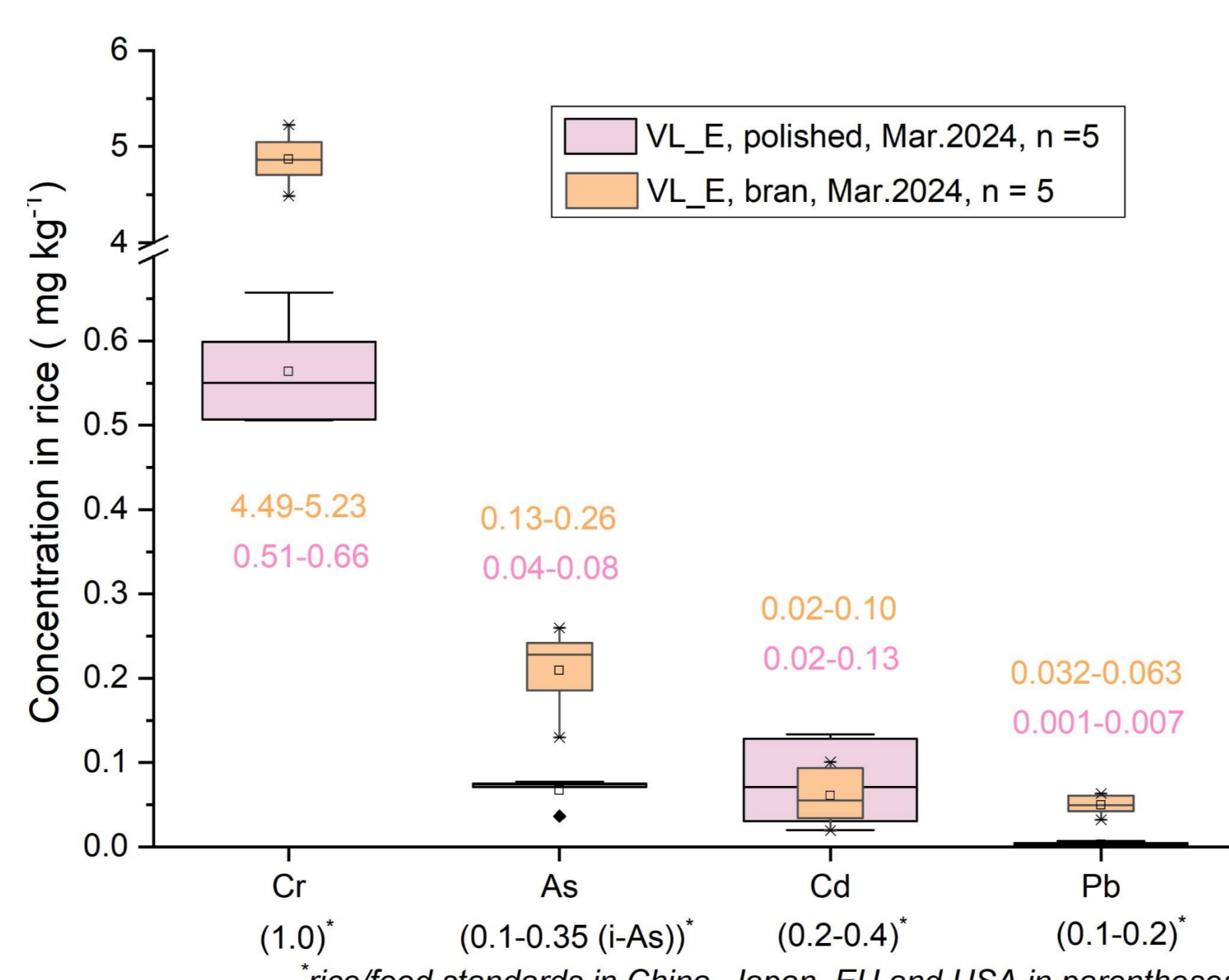


Figure 6. Concentration of heavy metals of interest in the polished rice grains and the brans/husks from the experimental paddy fields of this project in Vinh Long Province

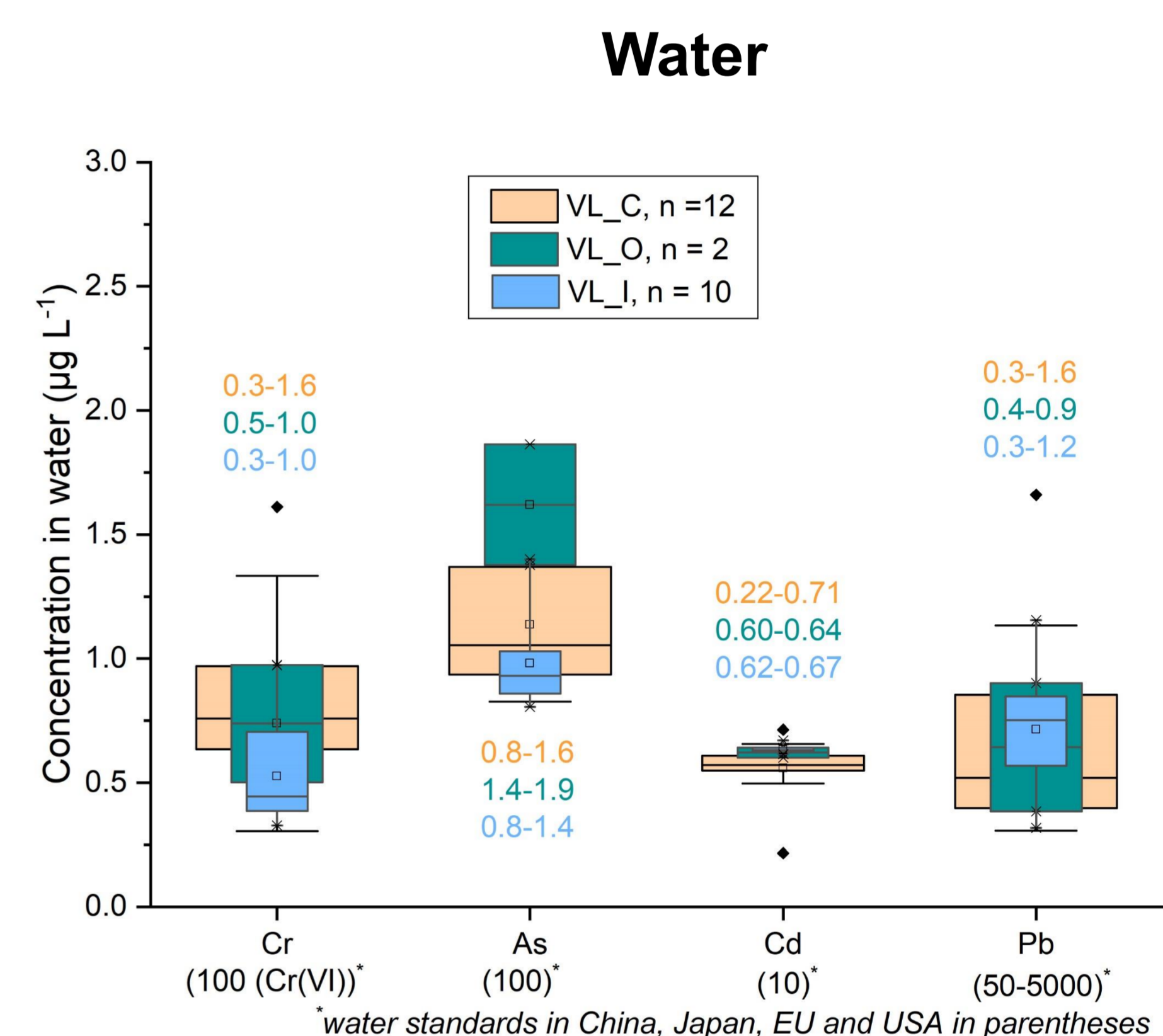


Figure 7. Concentration of heavy metals of interest in the irrigation water (I), and water from conventional (C) and organic (O) paddy fields in Vinh Long Province

Conclusion

- All the heavy metals of interest are at low levels in the soil and water of paddy fields in all three provinces. They are well below the soil and water quality standards issued by China, Japan, the EU and the USA.
- Heavy metals in polished rice grains are below the food quality requirements set by the above nations and regions. However, unpolished rice grains contain higher concentrations of heavy metals compared with their polished counterparts due to the accumulation of heavy metals in the bran. In some rice grains, As concentration is slightly higher than the strict EU regulation of 0.2 mg kg⁻¹, which can be a result of secondary contamination through e.g., the contact with soil or dust.
- In general, heavy metals are not a concerning issue for organic rice production at all fields in the present study.

Acknowledgement

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