Preliminary Investigation of Heavy Metals in Deposited Dust on Roadside Sidr Leaves

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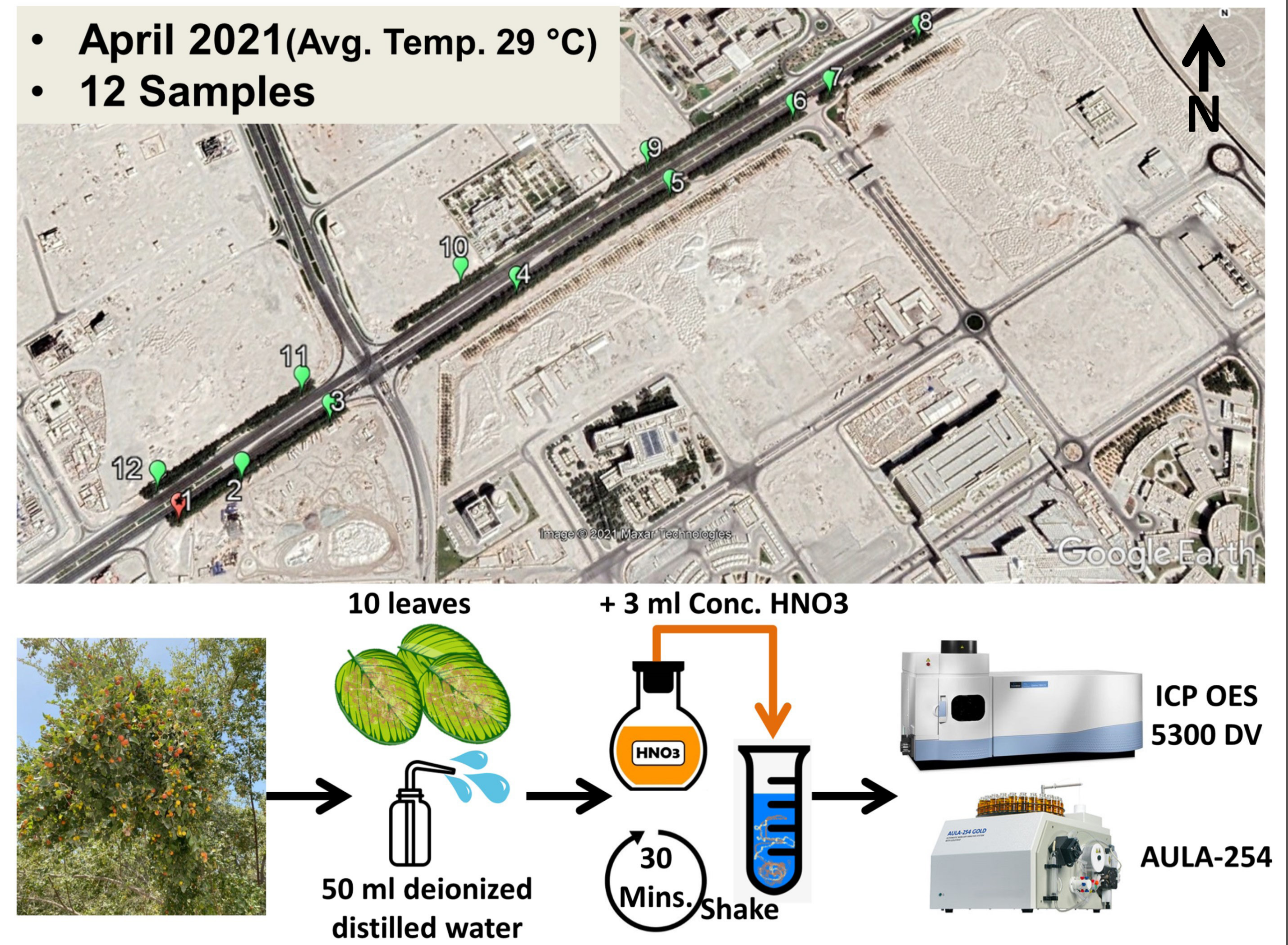
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1. Introduction

Traffic emissions are known as potential pollutants. These contaminants have a negative impact on roadside vegetation. Some roadside plants are capable of absorbing significant amounts of heavy metals; and thus, could be helpful as biomonitors of environmental pollution. Metals such as iron (Fe), cadmium (Cd), lead (Pb), copper (Cu), nickel (Ni), zinc (Zn) and manganese (Mn) may be released from various parts of the vehicle's internal mechanics into roadside surroundings. These pollutants then tend to accumulate on the soil surface. Anthropogenic and natural process then whip these dust particles in to the air depositing a considerable amount on the foliage of roadside trees. The Sidr tree, is common in Qatar and usually found planted in houses, gardens and roadsides. It is a strong grower in Qatar harsh environments and its flowering and fruiting in spring season (March–April). This current study was conducted to gauge the heavy metal deposition on the leaves of the Sidr tree by the roadside as a first step in evaluating the use of this plant as a bio-monitor of environmental pollution.
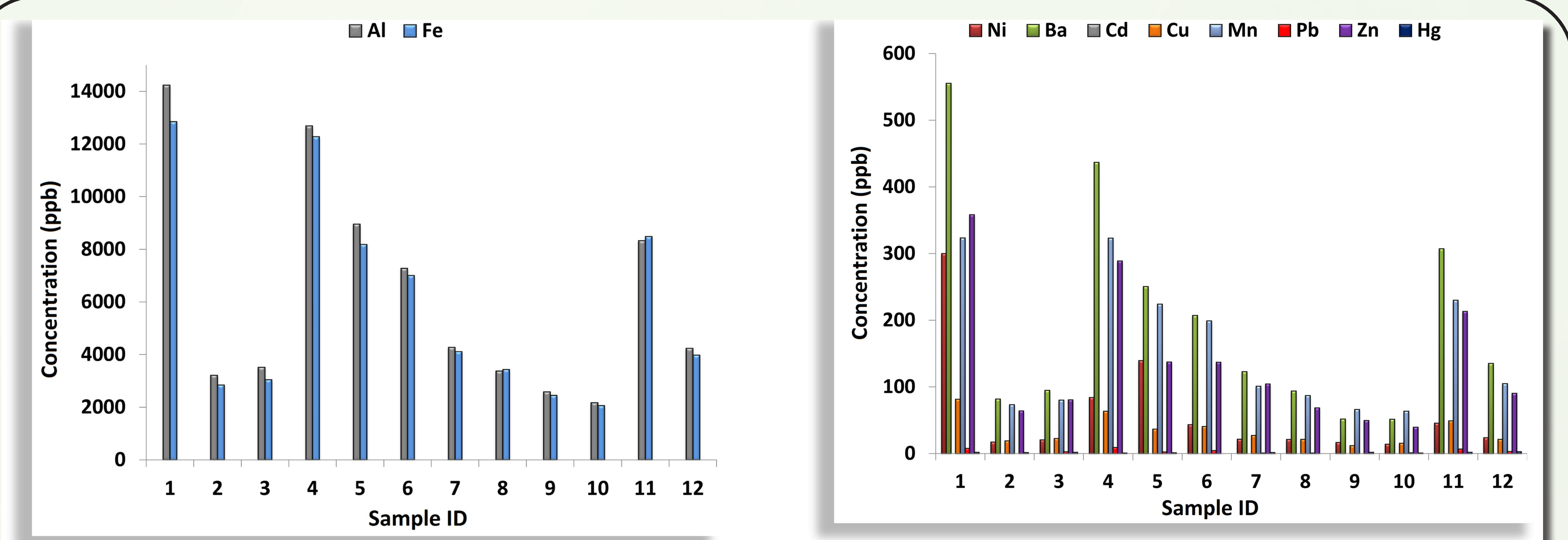
2. Methods

- April 2021 (Avg. Temp. 29 °C)
- 12 Samples

10 leaves → 50 ml deionized distilled water → + 3 ml Conc. HNO3 → 30 Mins. Shake → ICP OES 5300 DV / AULA-254
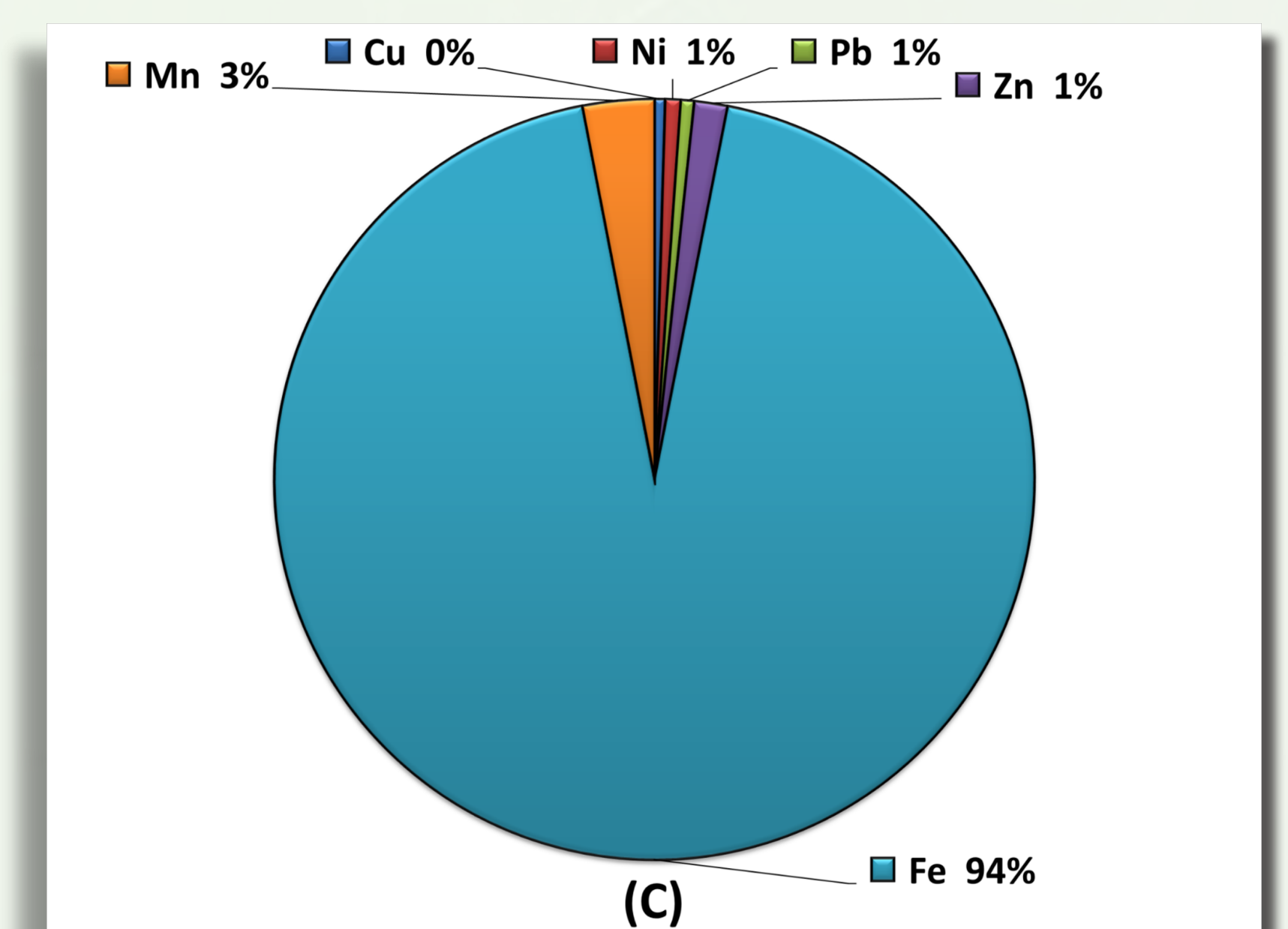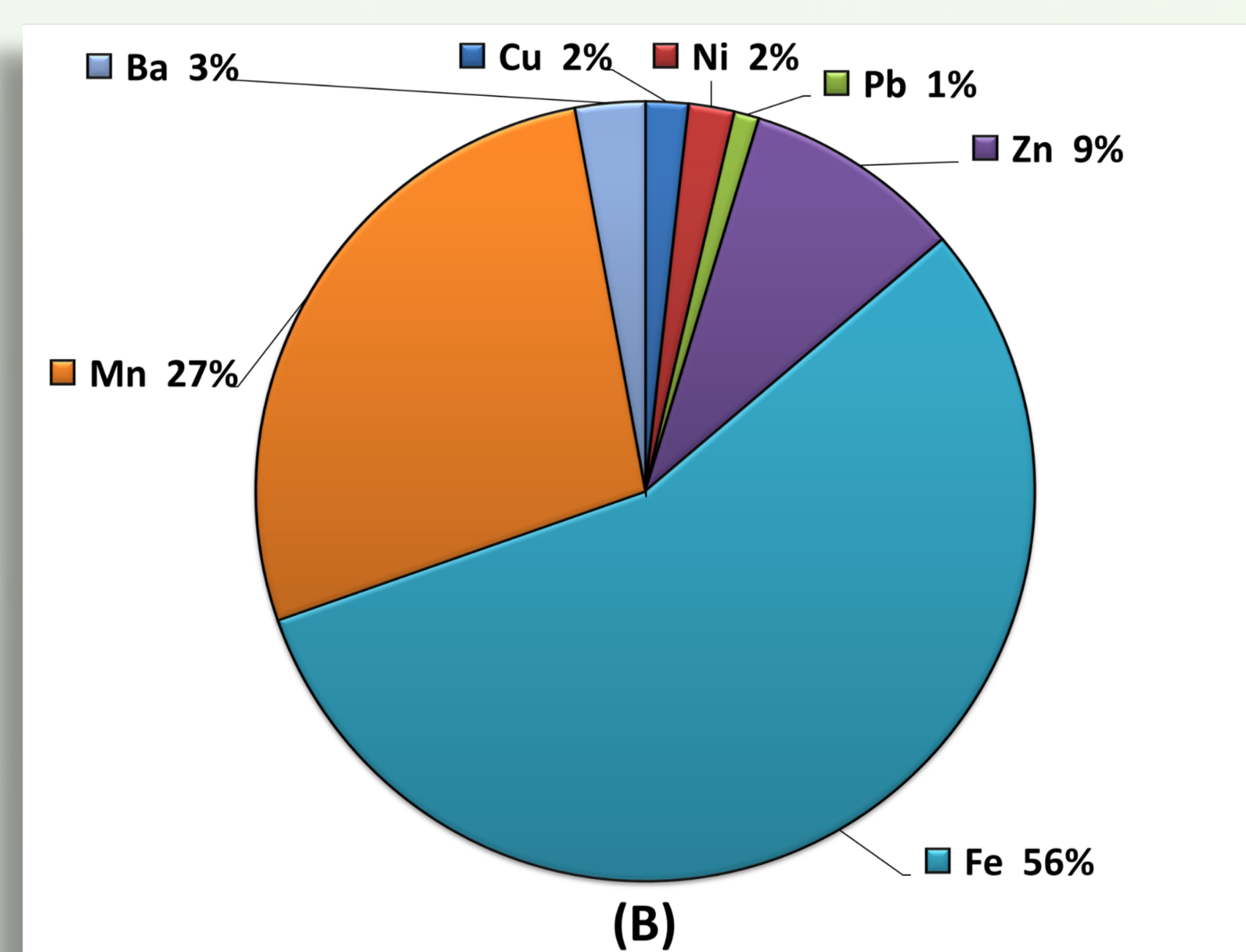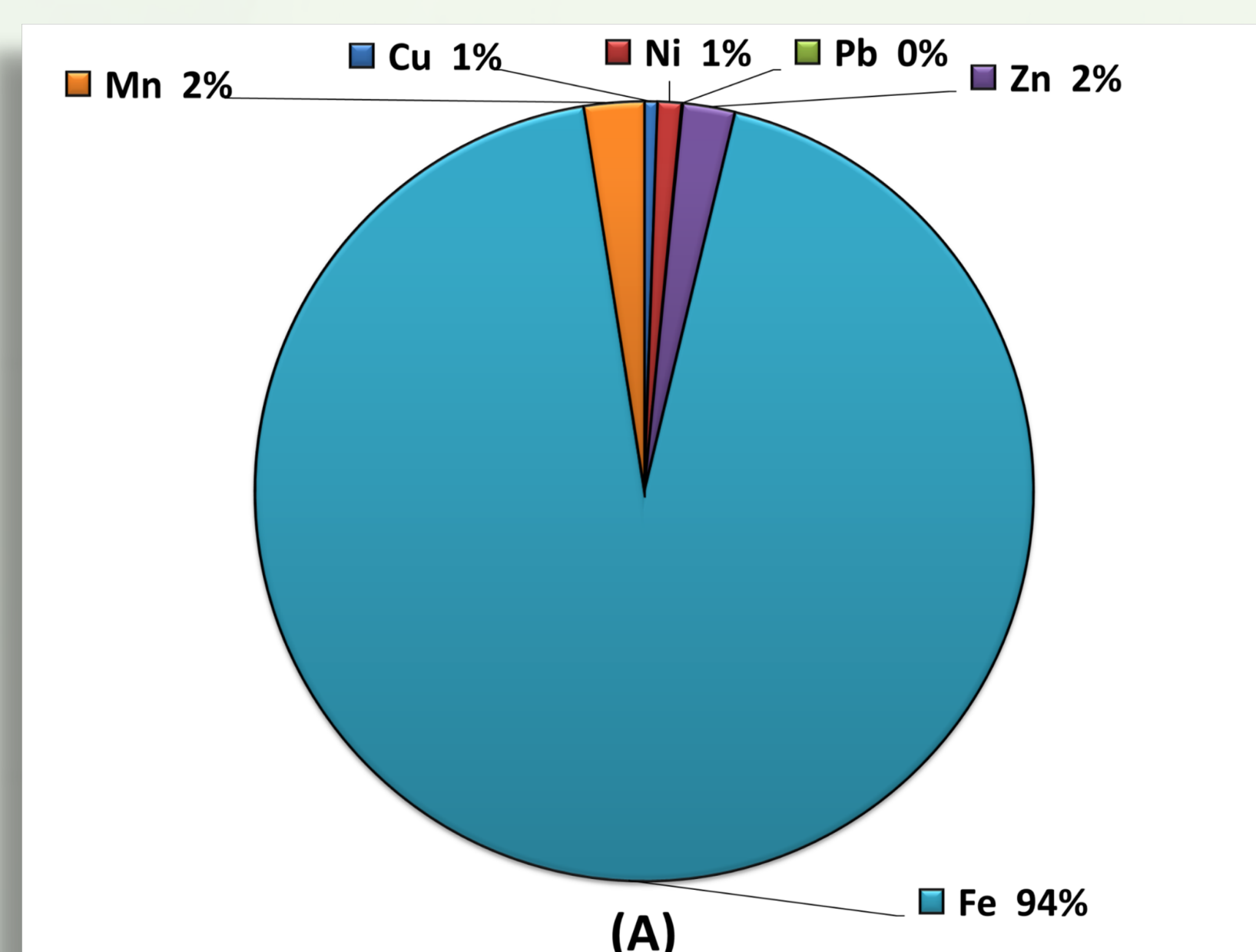
3. Results

- Highest concentration recorded in location 1 (denoted on map by 📍).
- Location 1: heavy digging and construction work, parking trucks, buses
- Strong positive correlation
- Similar distribution of trace metals in leaf dust samples from our study and Southwestern Iran

Heavy metal concentration (ppb) in leaf dust sample from the study area

(A) Qatar: Mn 2%, Cu 1%, Ni 1%, Pb 0%, Zn 2%, Fe 94%

(B) Hungary: Ba 3%, Cu 2%, Ni 2%, Pb 1%, Zn 9%, Mn 27%, Fe 56%

(C) Southwestern Iran: Mn 3%, Cu 0%, Ni 1%, Pb 1%, Zn 1%, Fe 94%

Distribution of trace metals in leaf dust samples. (A) Qatar, (B) Hungary, (C) Southwestern Iran

Ongoing Work

- Analysis of control sample (collected from farm).
- Seasonal collection.
- Air pollution index.

References

- Hrotkó, K., Gyeviki, M., Sütöriné, D. M., Magyar, L., Mészáros, R., Honfi, P., & Kardos, L. (2021). Foliar dust and heavy metal deposit on leaves of urban trees in Budapest (Hungary). Environmental Geochemistry and Health, 43(5), 1927-1940.
- Naderizadeh, Z., Khademi, H., & Ayoubi, S. (2016). Biomonitoring of atmospheric heavy metals pollution using dust deposited on date palm leaves in southwestern Iran. Atmósfera, 29(2), 141-155.
- Simon, E., Baranyai, E., Braun, M., Cserháti, C., Fábián, I., & Tóthmérész, B. (2014). Elemental concentrations in deposited dust on leaves along an urbanization gradient. Science of the Total Environment, 490, 514-520.