# MOBILITY OF HEAVY METALS AT THE INTERFACE: PLANT-SOIL IRRIGATED WITH TREATED WASTEWATER

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# Water Challenges

**Climate change**

**Aridity**

**Population growth**

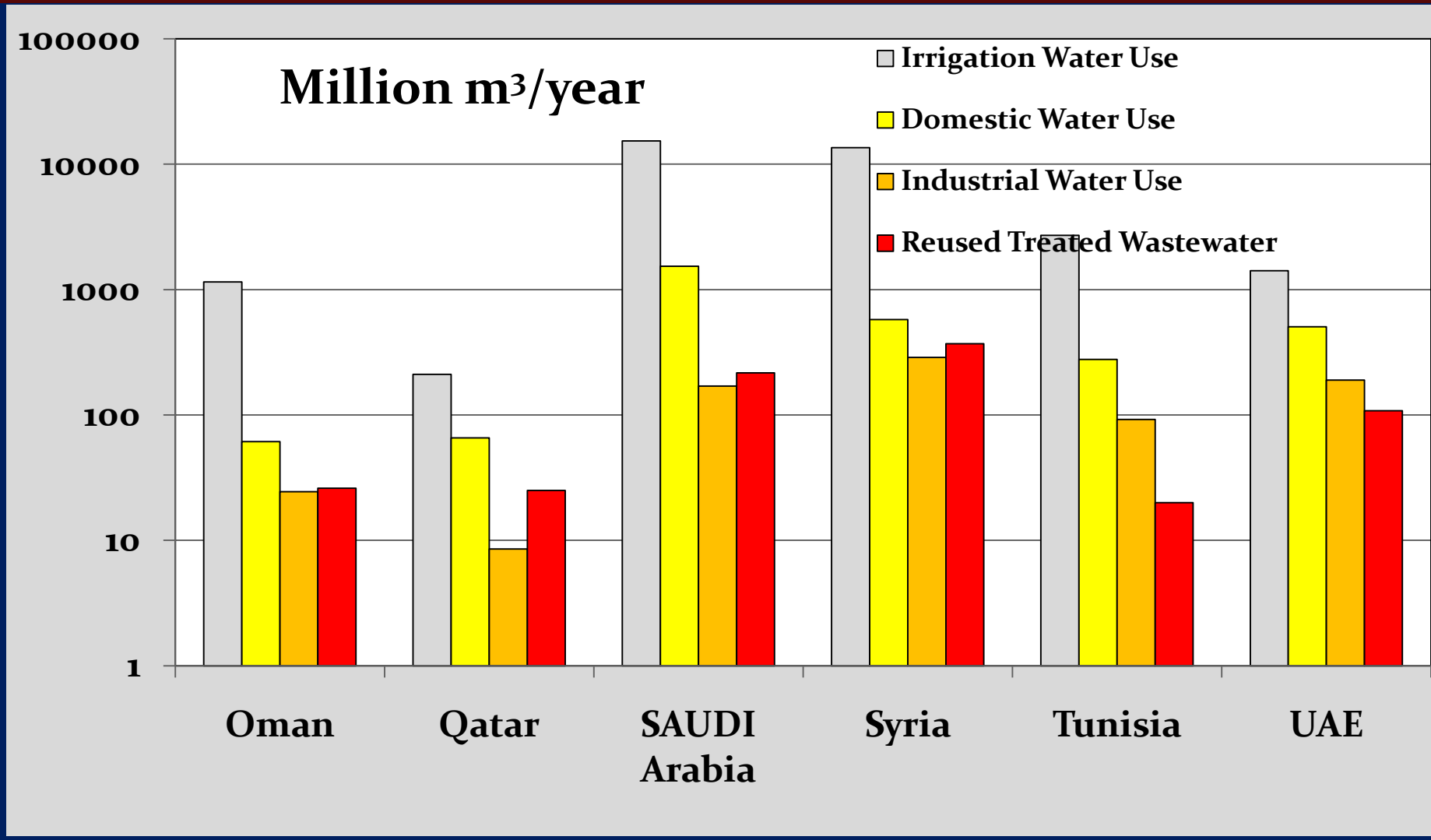
**Degradation of Resources**

Water deficit:

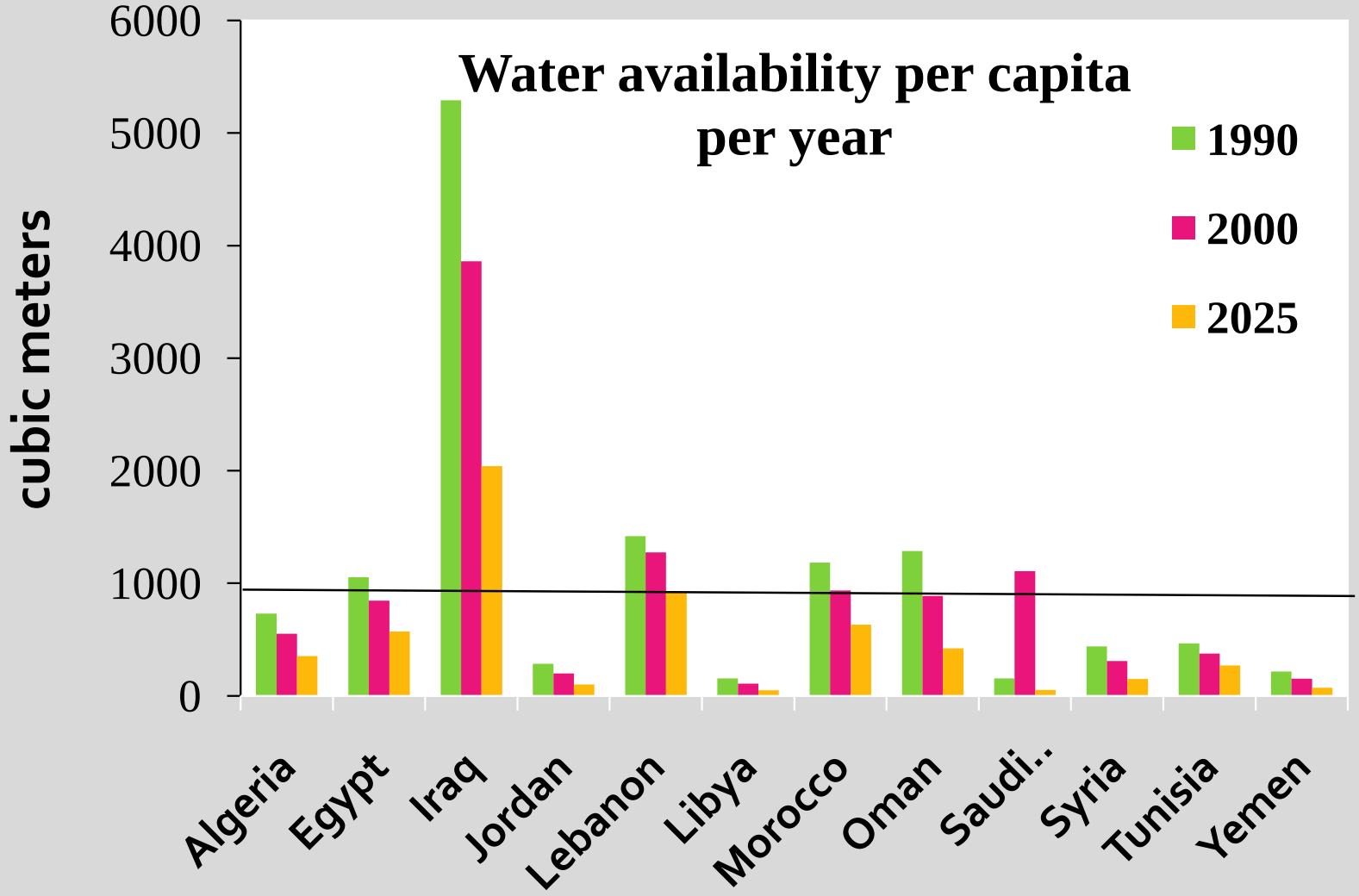
**Other resources**

# Water Uses in the Arab Region

(Source: WRI 2000-2001, FAO 1997,GEO3)



# Renewable water availability per capita



# Objectives of this study

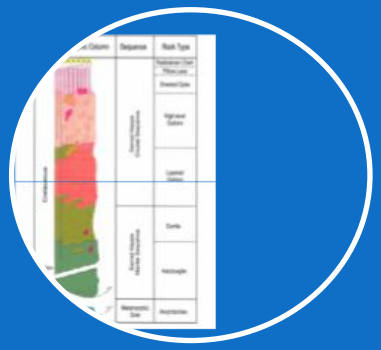
- Investigate the mobility of heavy metals (V, Cr, Co, Ni, Cu, Zn, Rb, Sr, Ag, Cd and Pb with lanthanides) in soils irrigated with treated wastewater (TWW)

- Determine the impact of TWW on the biological absorption coefficient (BAC) of heavy metals by different species of plants.

# Material

**Plants**

**5 species**



**Soils**

**Waters**


Bougainvillea spectabilis


Plumeria obtura


Pithecolobium dulce


Prosopis juliflora


Phoenix dactylifera
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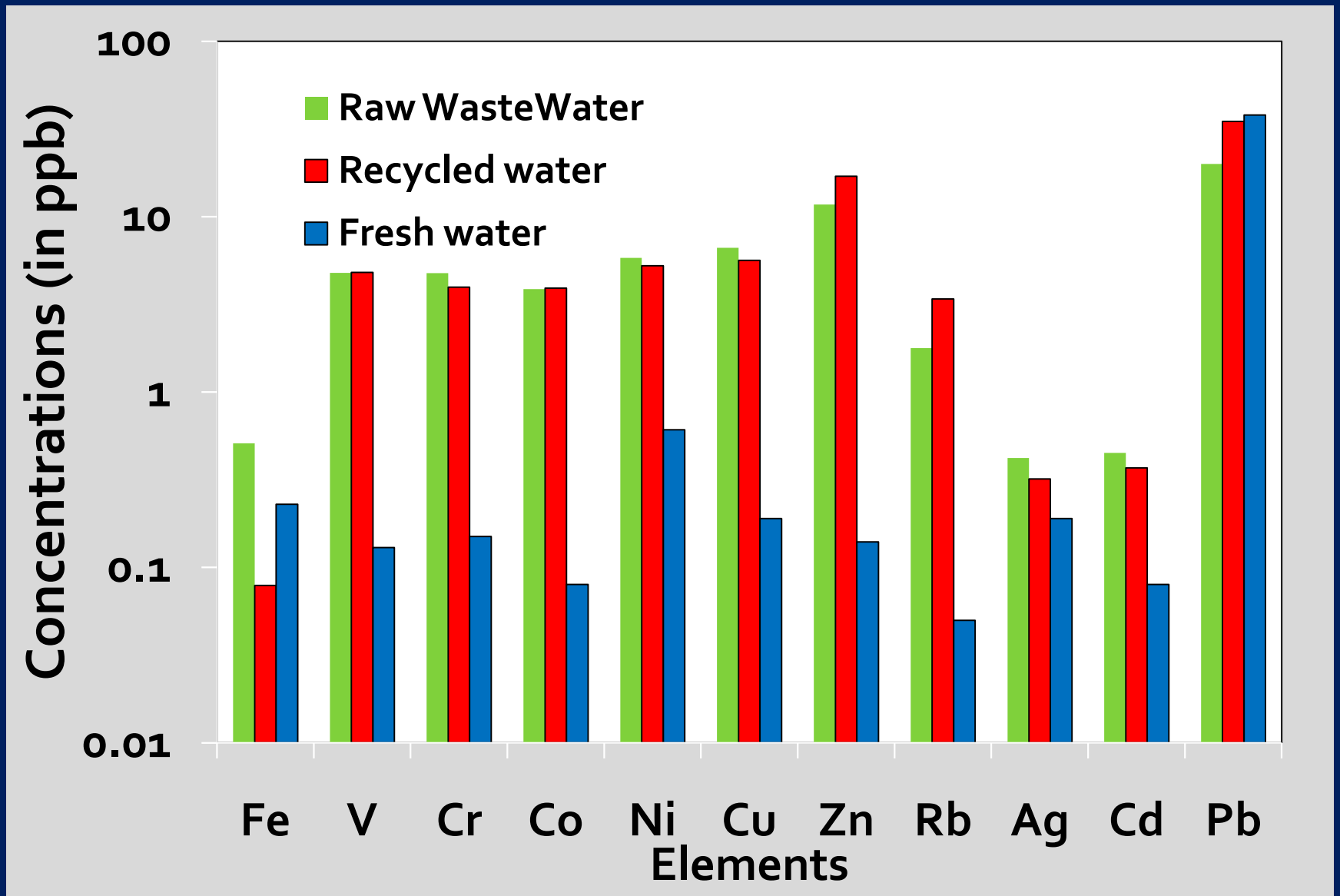
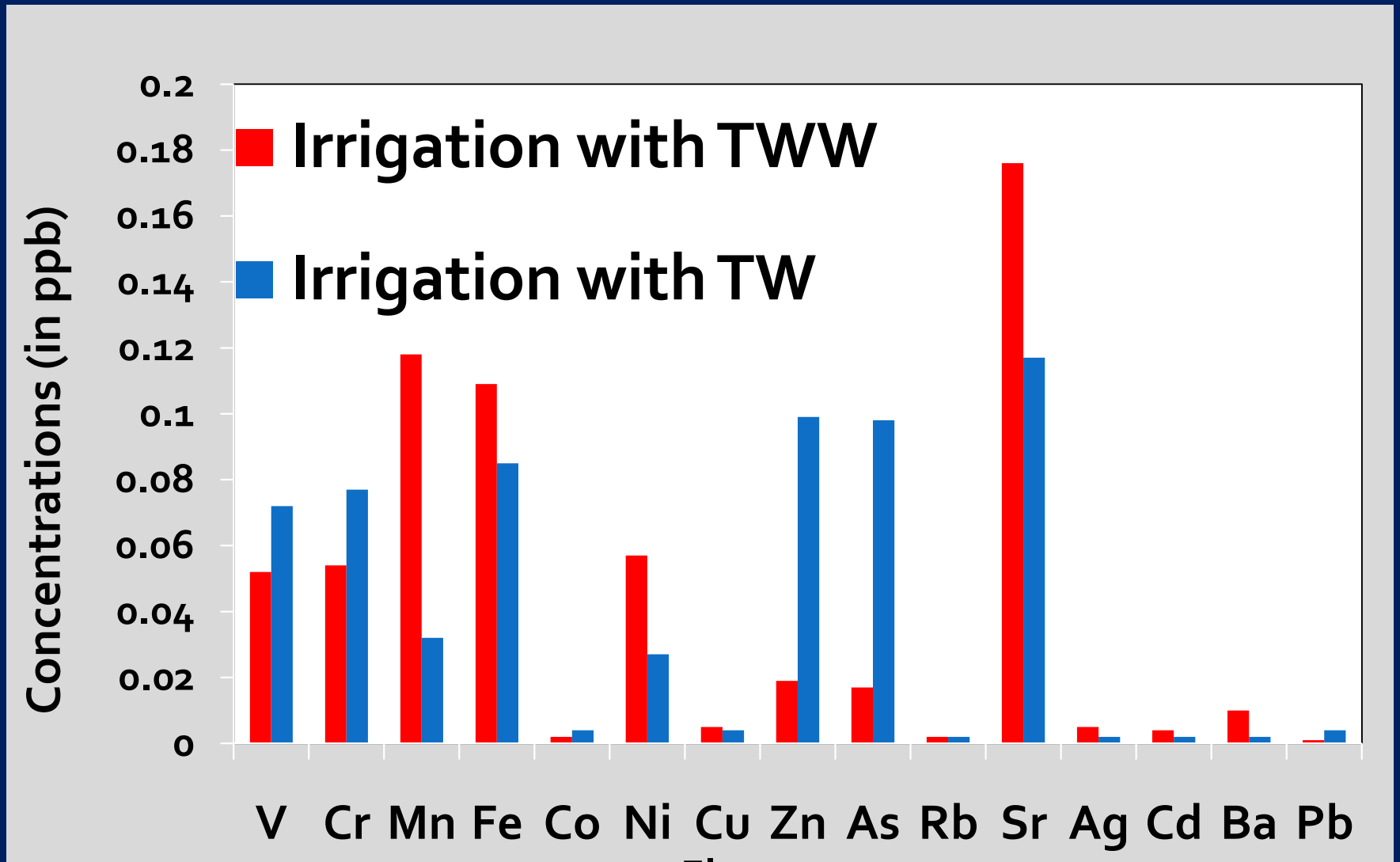
- **RESULTS**

# Quality of recycled wastewater

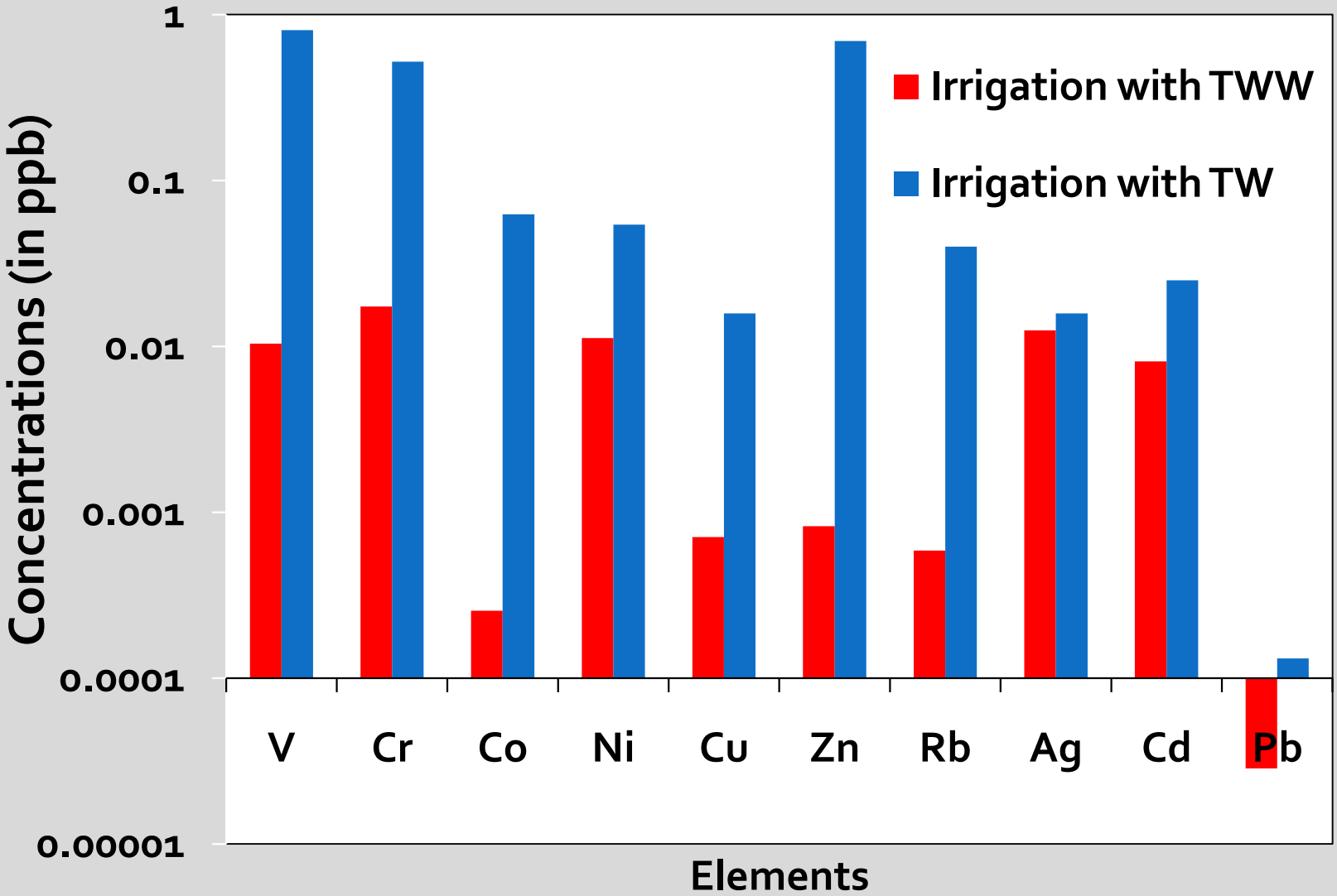


- **Response of soils to irrigation with treated wastewater (TWW) compared to tap water (TW)**

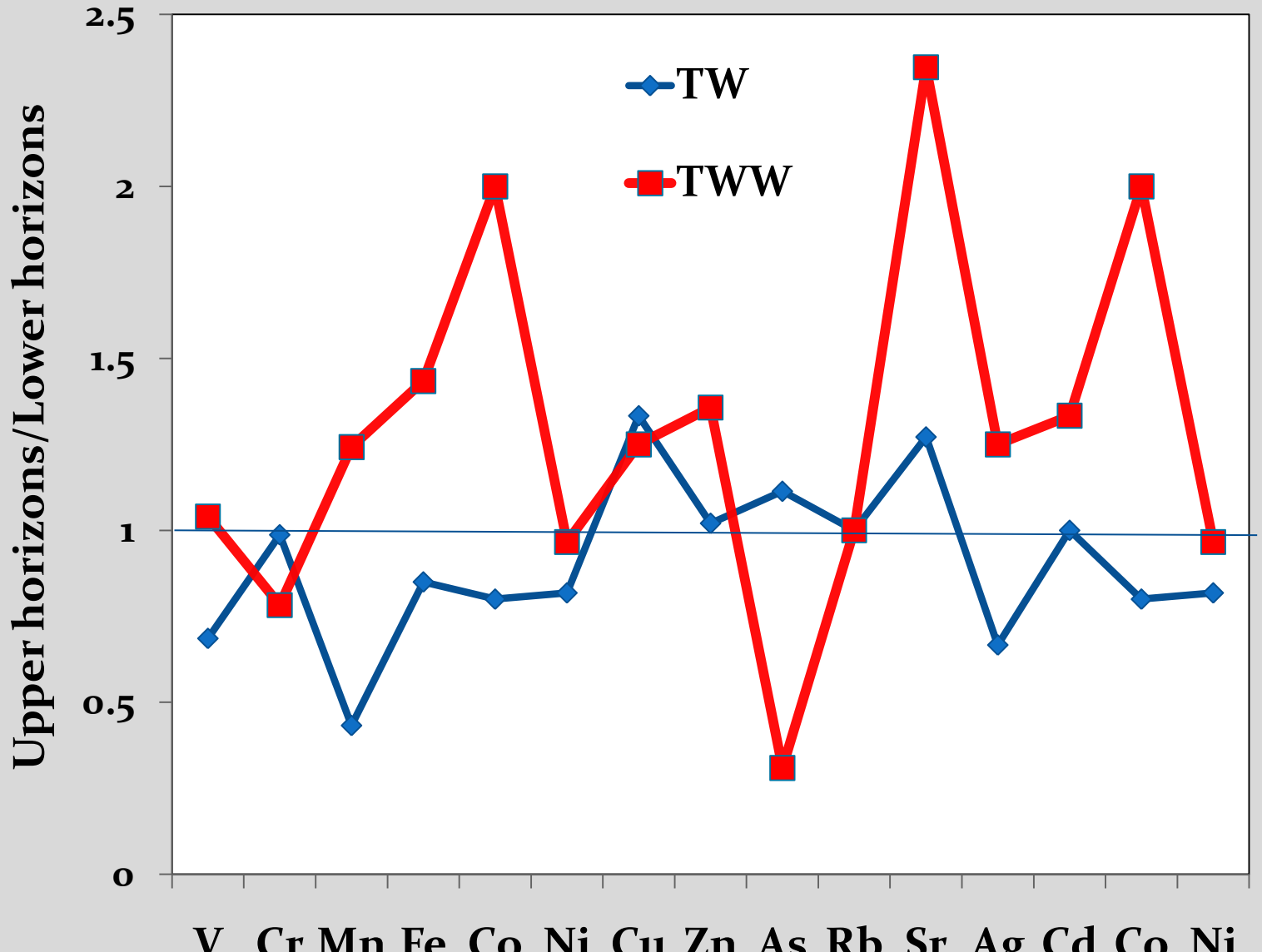
# 0-20cm horizons
# TWW>TW for Fe, Mn, Ni,Sr, Ba, Ag, Cd



# 20-30cm horizons
# TW>TWW

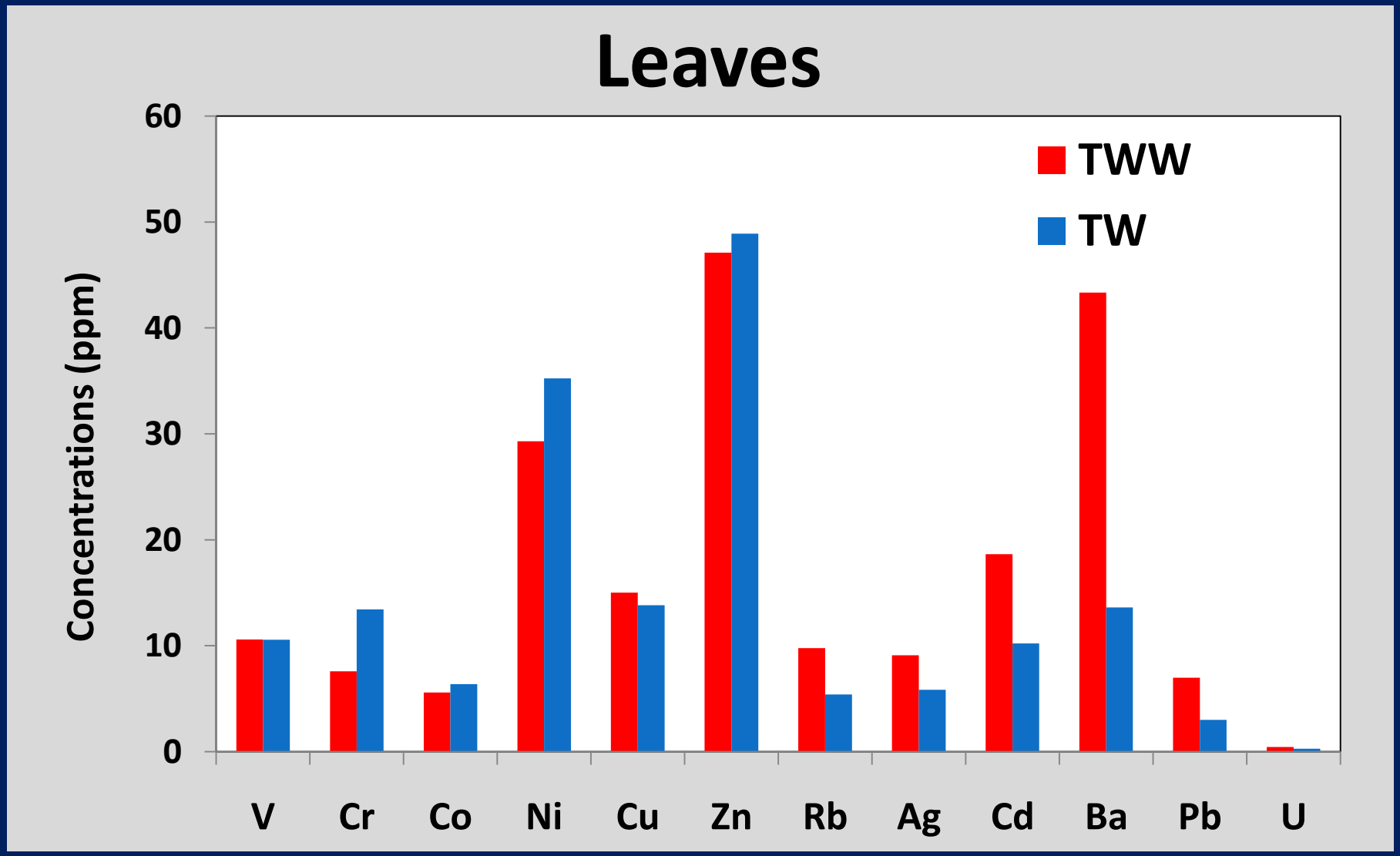


# Leaching of heavy metals

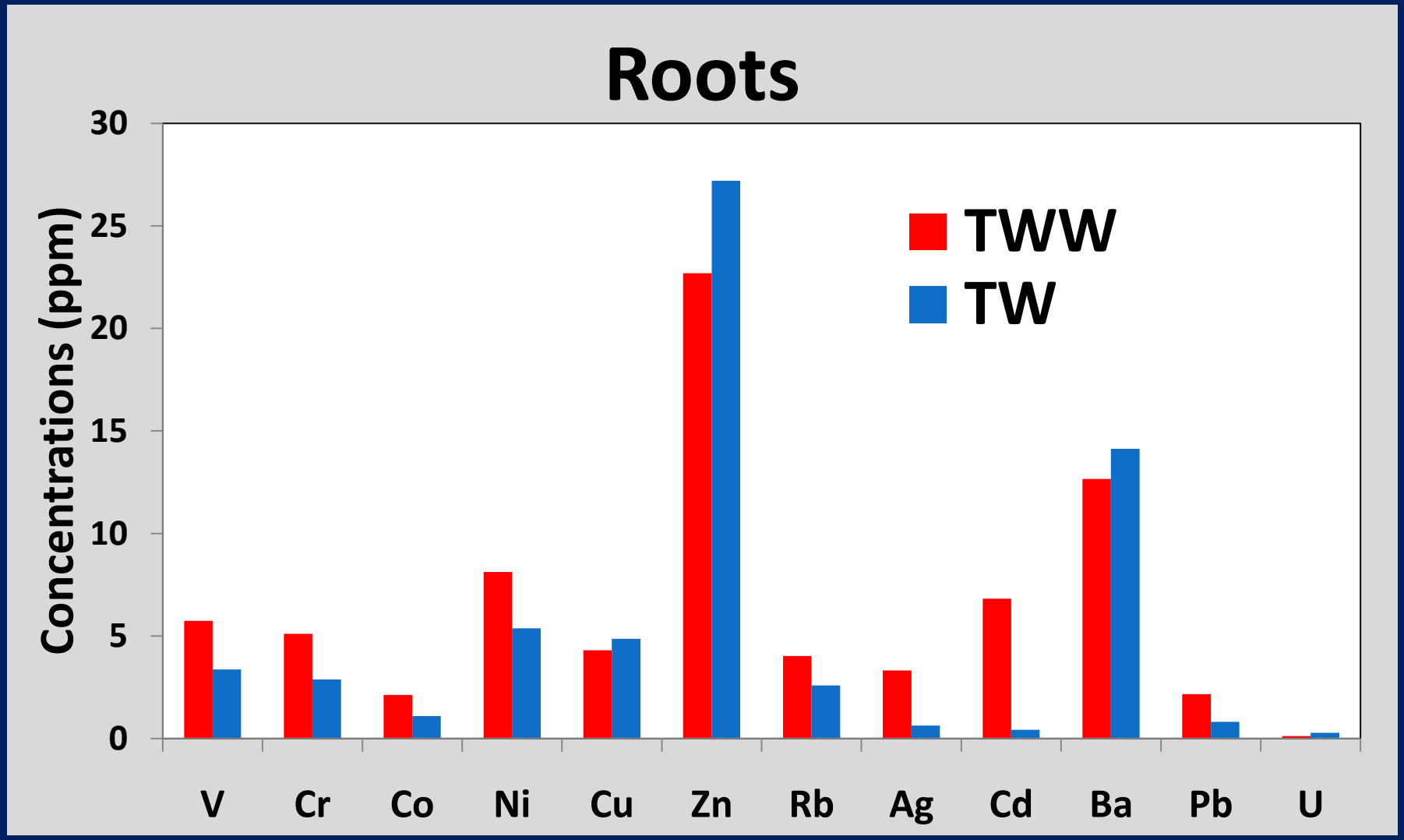


- **Response of plants to irrigation with TWW**

# Plants irrigated with treated wastewater (TWW) and tap water (TW)



# Plants irrigated with treated wastewater (TWW) and TW



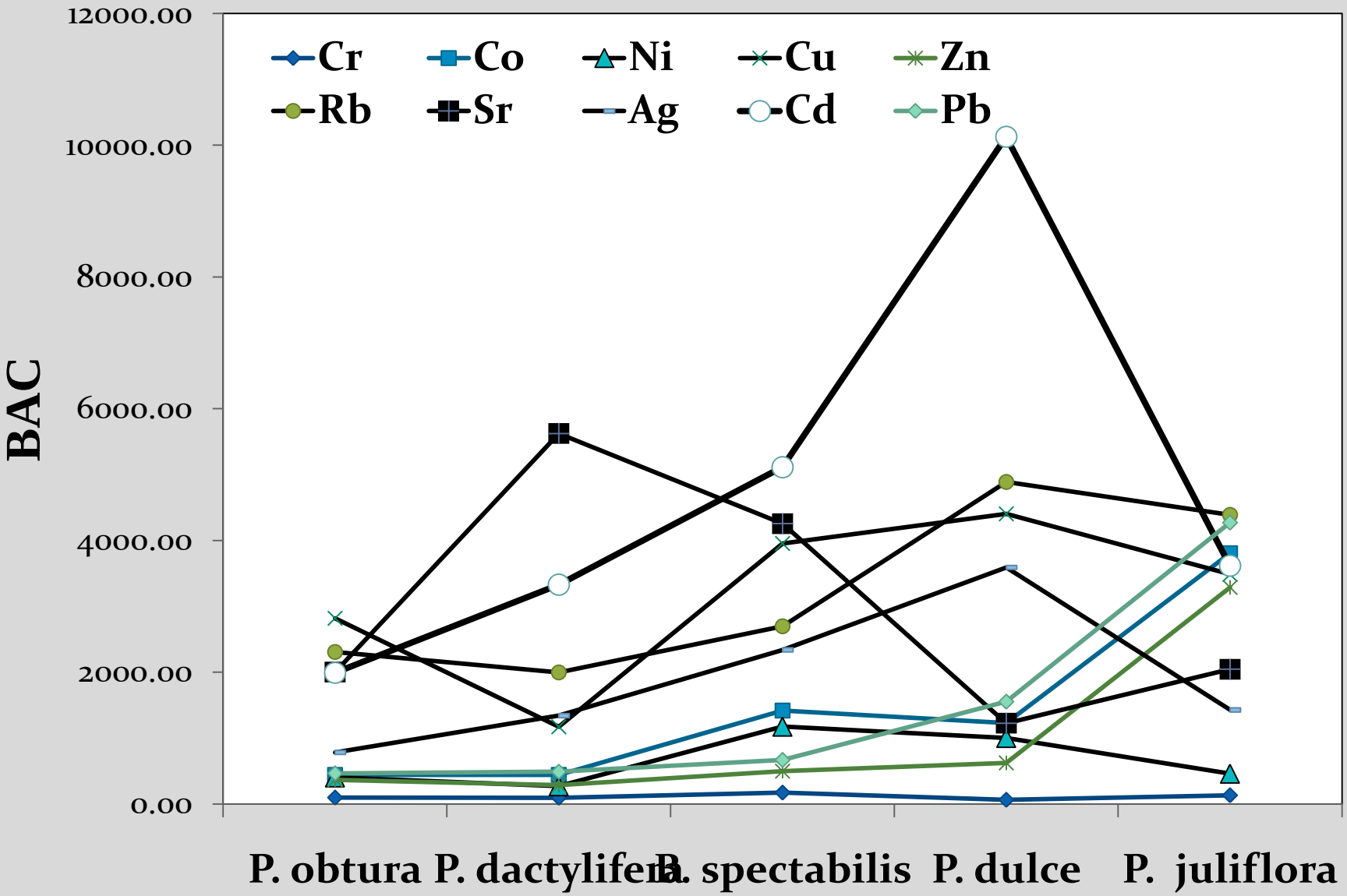
- Biological absorption coefficient (BAC)

$BAC = C_p/C_s$

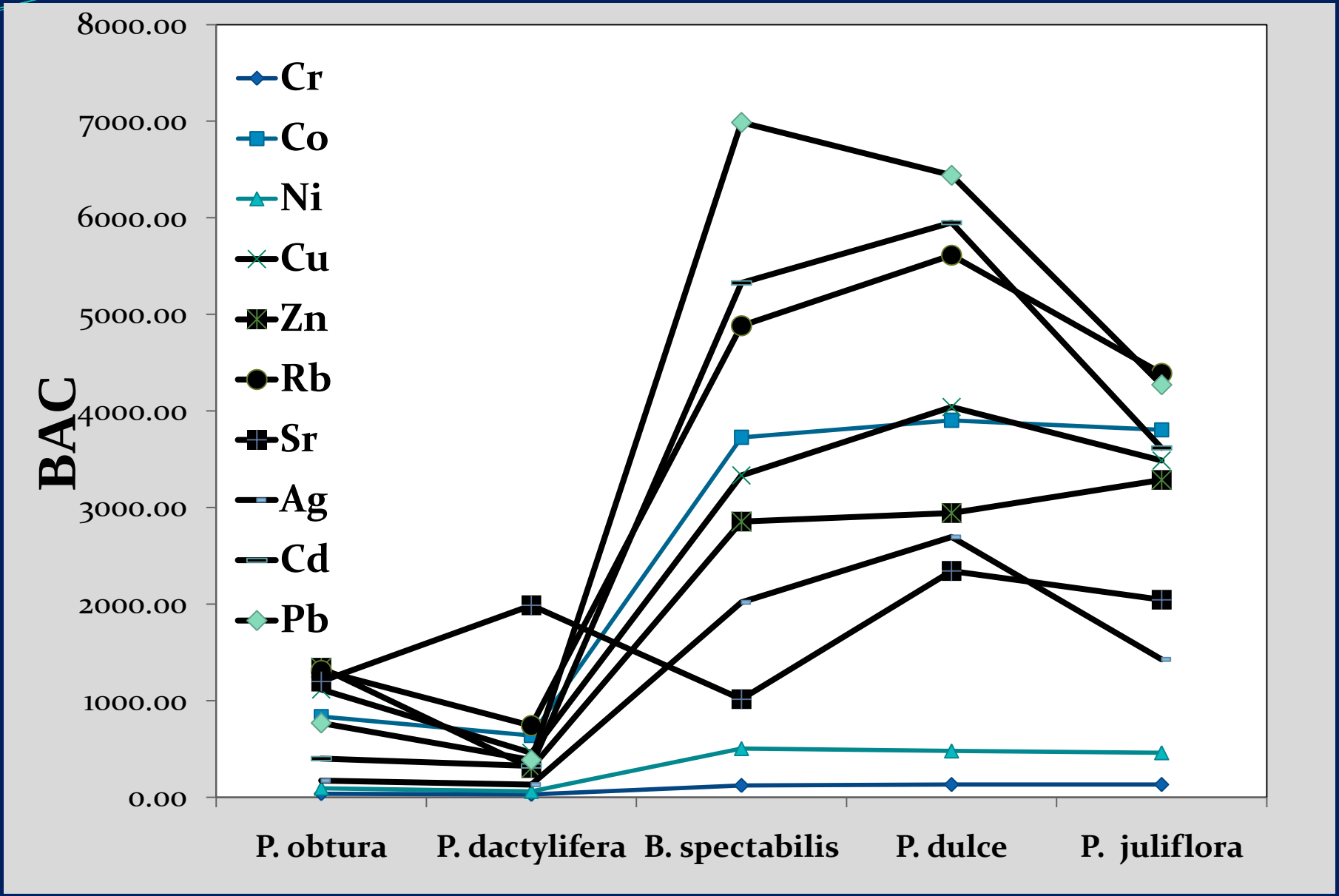
$C_p$ : concentration of elements in plants

$C_s$: concentration of elements in the soil

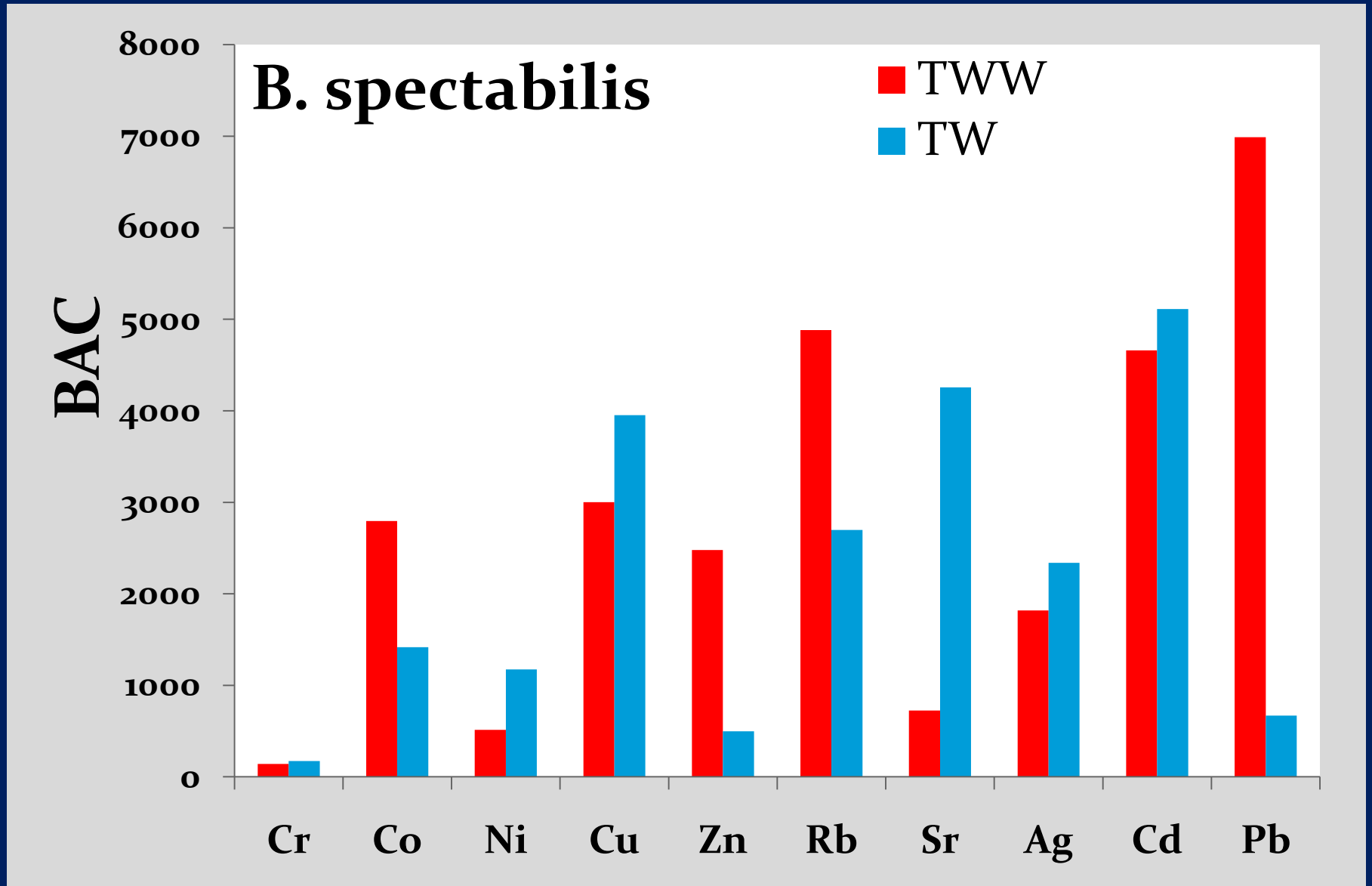
# Plants irrigated with TW



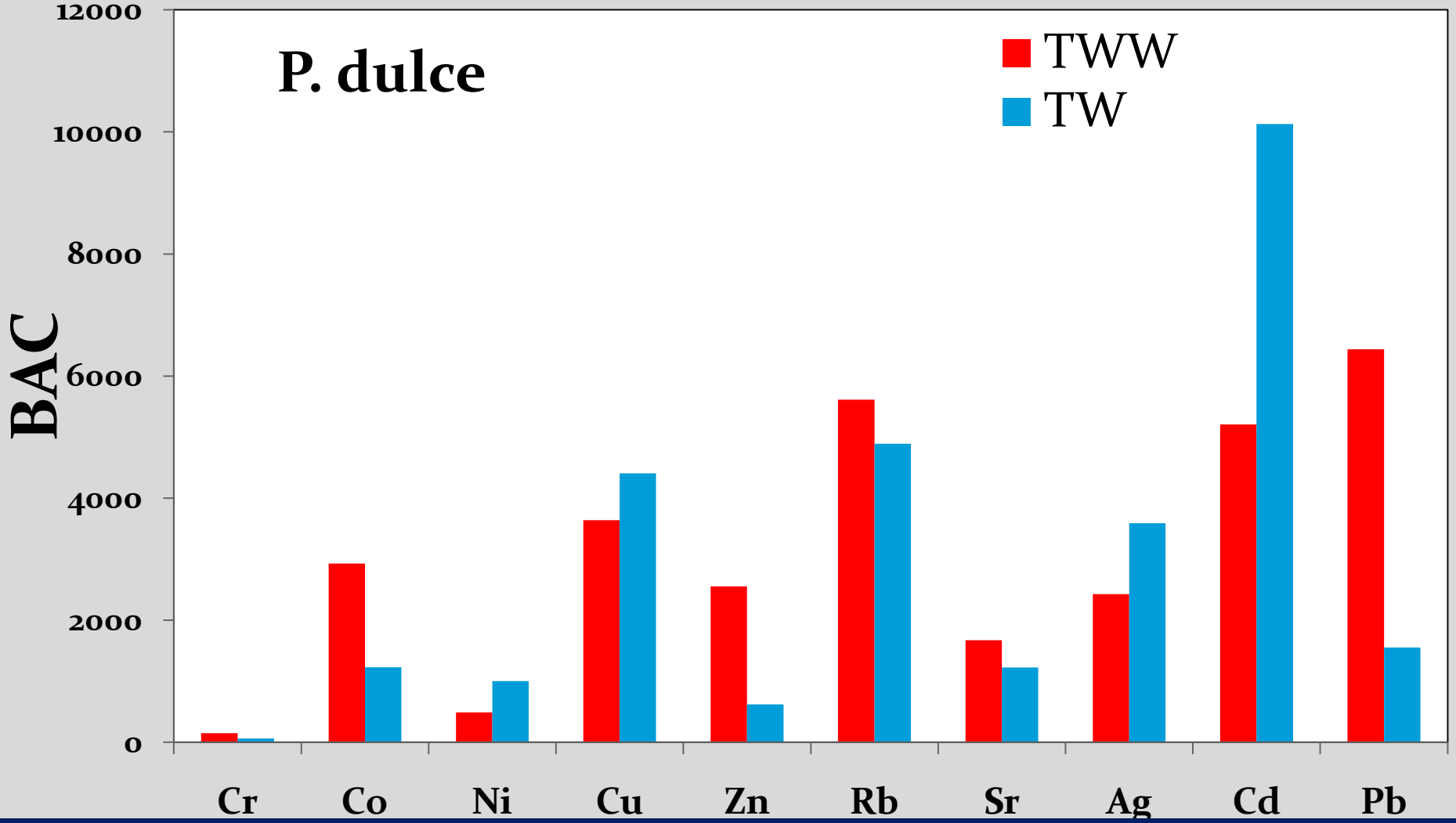
# Plants irrigated with TWW



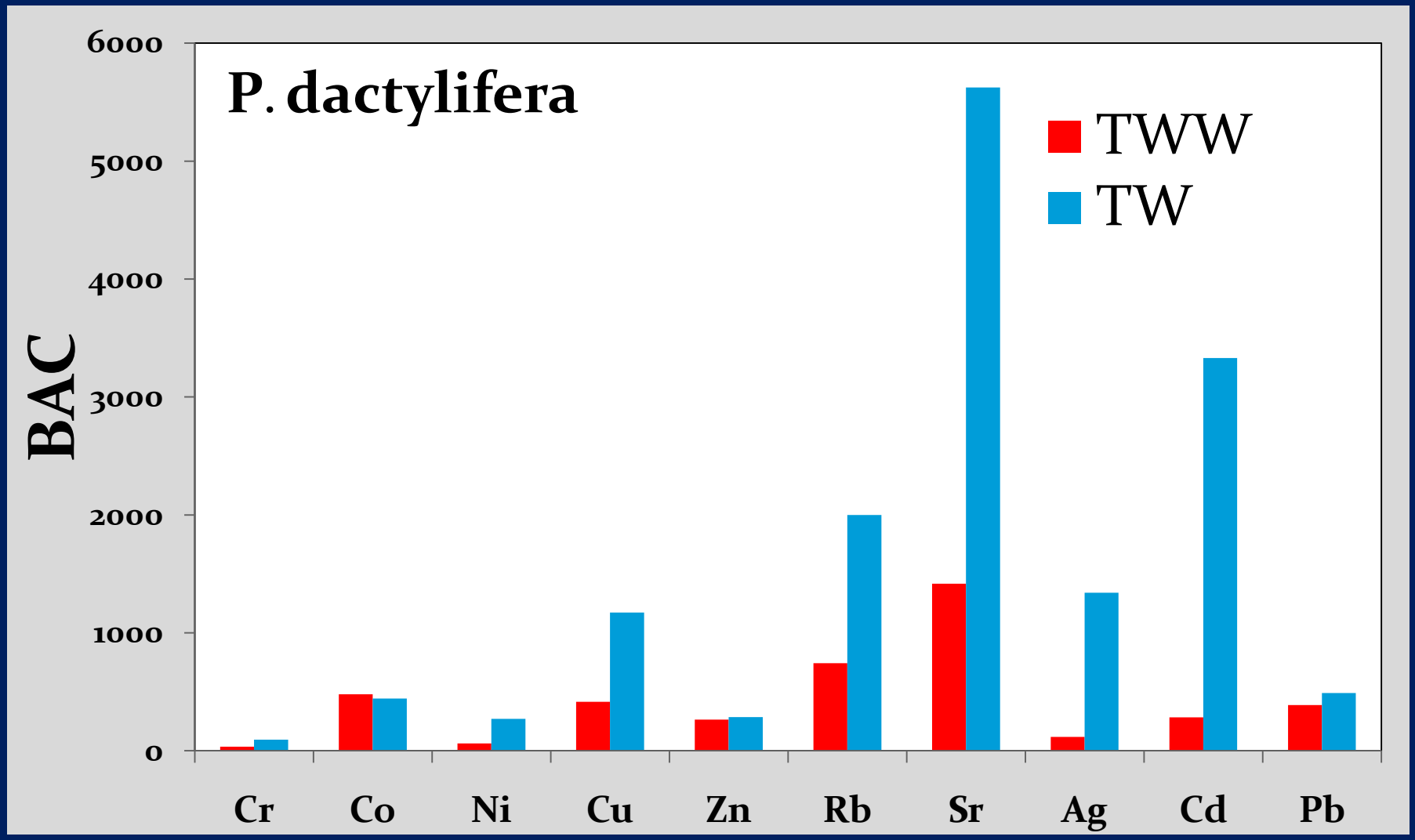
# More uptake from TWW irrigated soil except Cu, Sr and Cd



# TW>TWW except for Co, Rb, Sr and Pb
# Uptake from TWW: Pb>Rb>Cd>Cu>Co>Zn

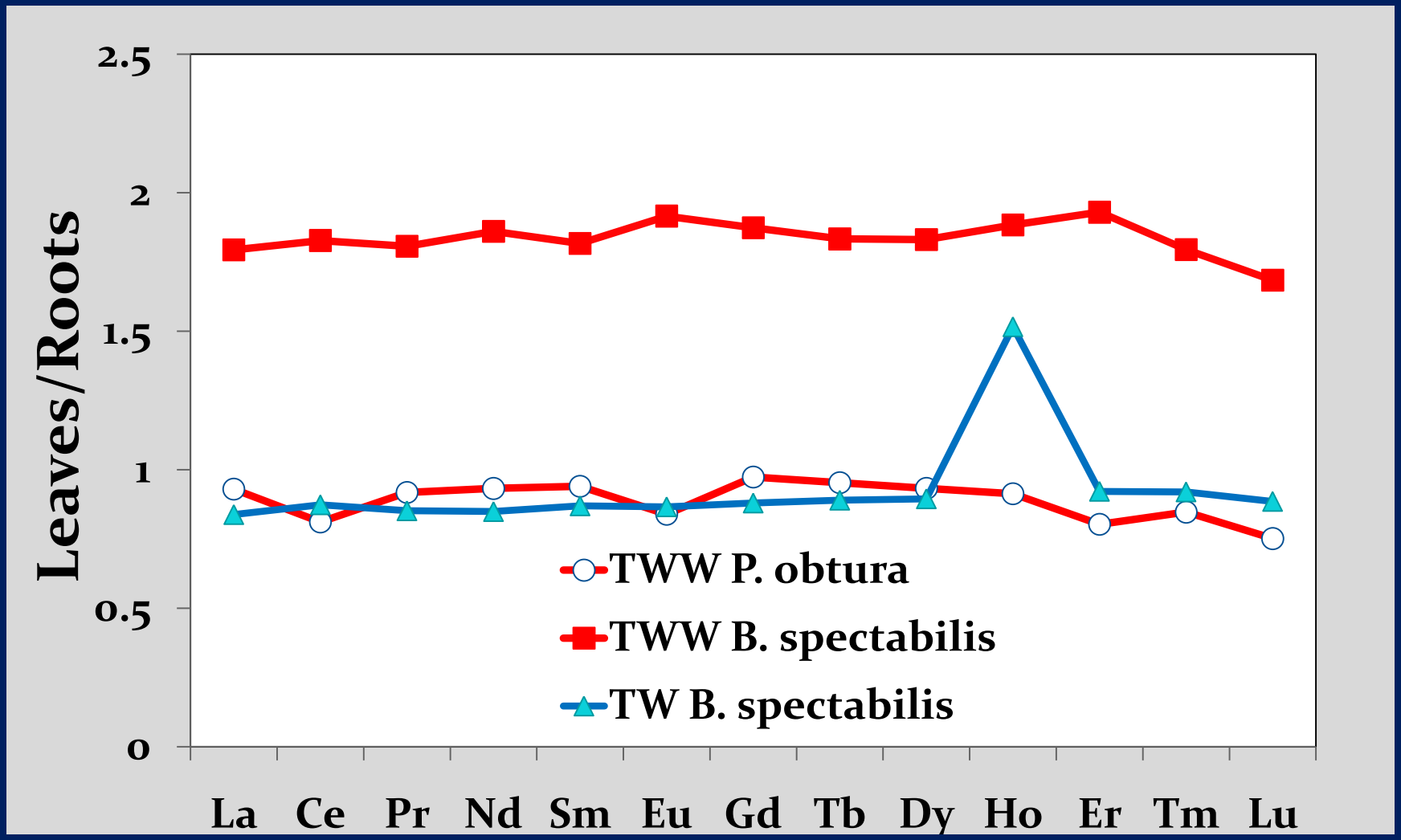


# More uptake from TW irrigated soil than from TWW soil

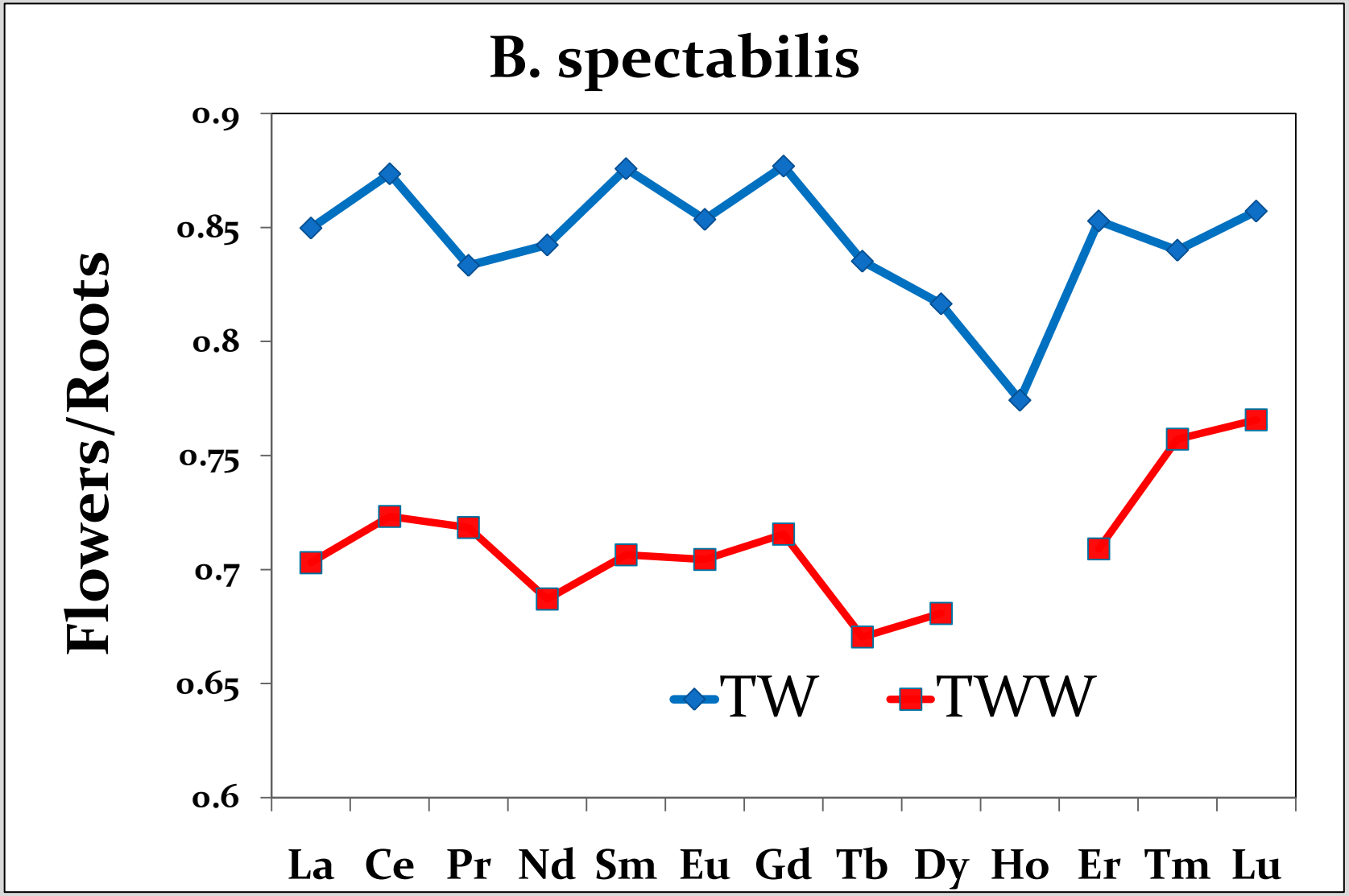


- Lanthanidess
- **La,…….Lu**

# Translocation roots-leaves: No fractionation of lanthanides



# Translocation roots-flowers: There is a fractionation



# Conclusion

- Treated wastewater contains relatively higher concentration of Zn, Sr and Pb compared to raw wastewater
- Biological absorption coefficient is more affected by species type than by irrigation water
- B. spectabilis is more accumulator of heavy metals than the other species

- Thank you for your attention