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Climate-Smart Land Remediation: Using *Salix babylonica* for Natural Water Purification

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INTRODUCTION & AIM

Land ecosystems are vital for climate resilience, supporting hydrological cycles, pollutant removal, and ecological restoration. In this study, *Salix babylonica* (weeping willow) was investigated as a sustainable biosorbent for water treatment.

Objective: To evaluate willow leaf and root powders as eco-friendly adsorbents for water purification, contributing to sustainable climate adaptation.

METHOD

Adsorbent preparation
Willow leaves and roots were collected, dried, ground, and sieved into fine powders

Characterization
FTIR → Identified functional groups (-OH, C=O, C–H)
Granulometry → Determined particle size distribution (roots ~517 µm, leaves ~678µm)

Batch adsorption experiments
Pollutants: Ca^{2+}, Mg^{2+} and Crystal Violet (CV)
Variables tested: contact time, pH, temperature

Performance evaluation
Adsorption efficiency (%) calculated for each condition

RESULTS & DISCUSSION

- **- Characterization**
- **FTIR**

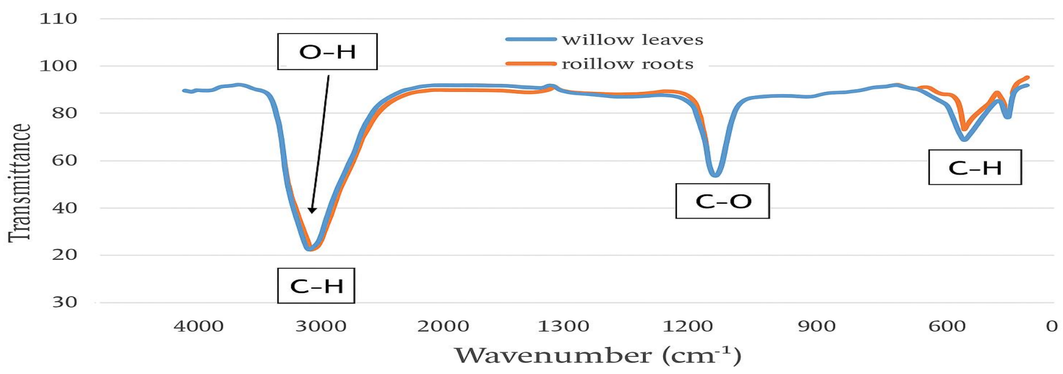

Figure 1. FTIR spectra fo willow leaf and root powders.

- **Granulometry**

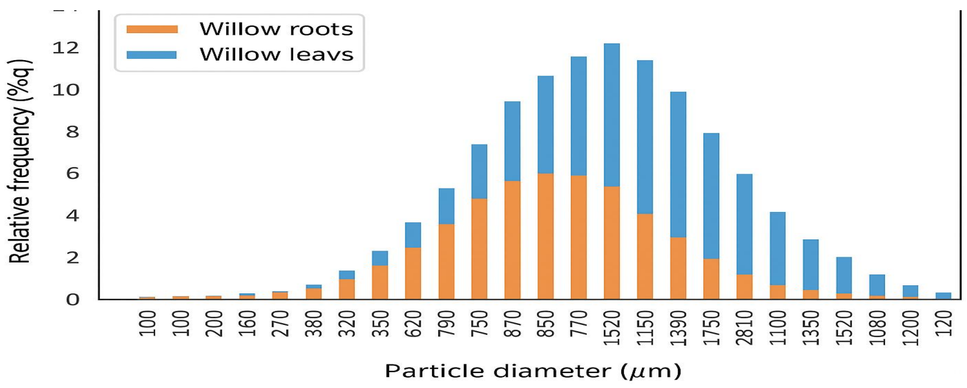

Figure 2. Particle size distribution (granulometry) of willow root and leaf powders.

Table 1. Average particle diameters of willow powders.

Powder Type	Diameter (µm)
Willow roots	517.2
Willow leaves	678.5

- **Atomic Absorption Spectroscopy (AAS) for Ca^{2+} and Mg^{2+} ions adsorption:**

- Effect of contact time

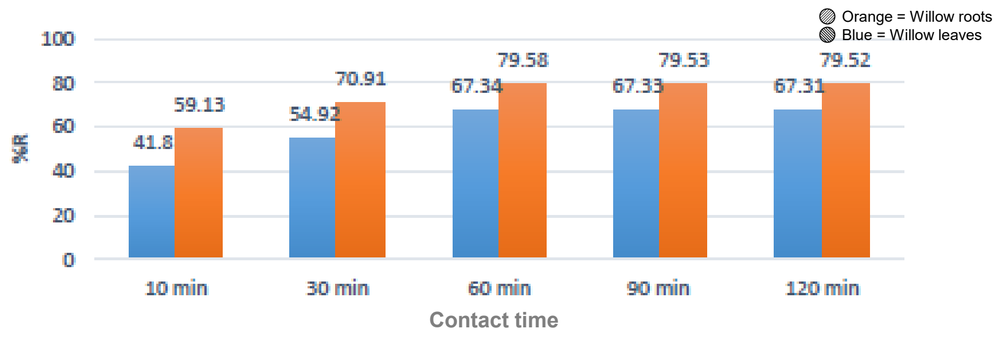

Figure 3. Effect of contact time on Mg^{2+} adsorption by willow root and leaf powders.

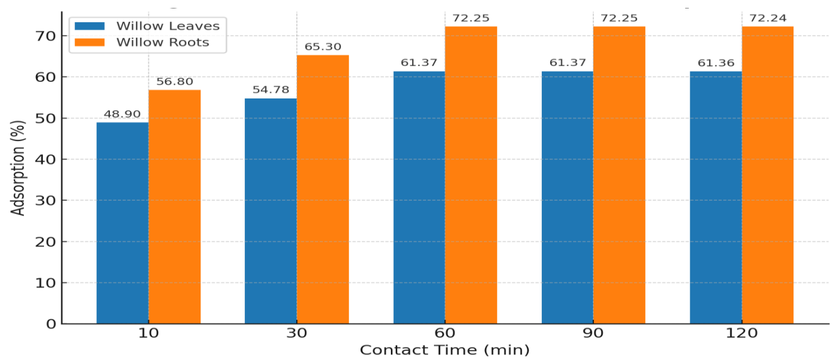

Figure 4. Effect of contact time on Ca^{2+} adsorption by willow root and leaf powders.

- Effect of temperature.

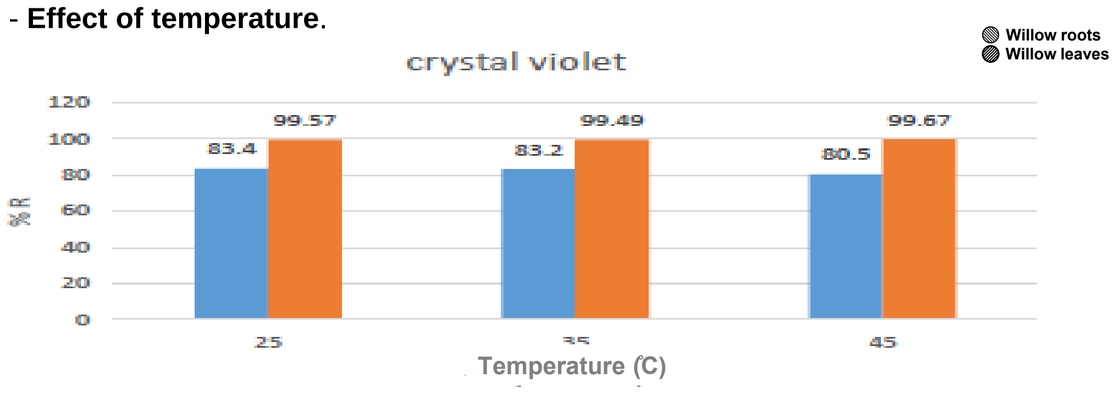

Figure 5. Effect of temperature on Crystal Violet adsorption by willow root and leaf powders.

- Effect of pH

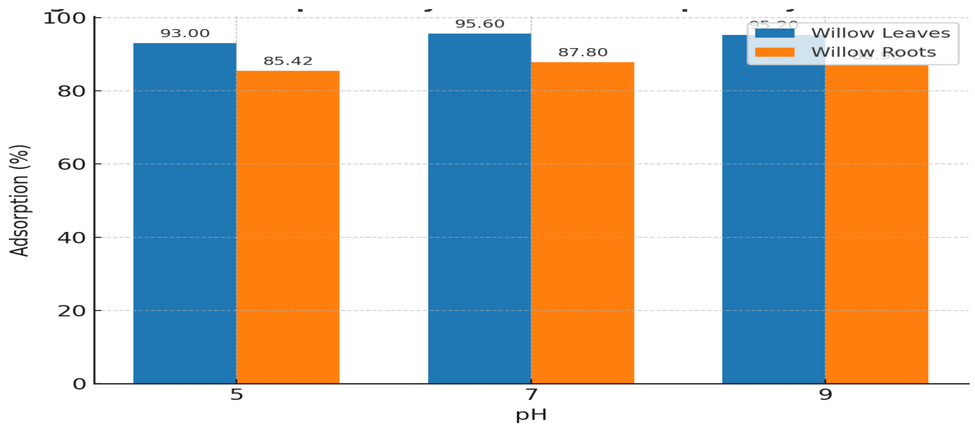

Figure 7. Effect of pH on Crystal Violet adsorption by willow root and leaf powders.

CONCLUSION

Willow powders are green, low-cost, and efficient adsorbents for Ca^{2+}, Mg^{2+}, and Crystal Violet. They reduce reliance on energy-intensive technologies, lowering the carbon footprint of water treatment. This approach supports a circular economy and enhances climate resilience in water-scarce regions.

FUTURE WORK / REFERENCES

- Apply willow powders to real wastewater samples for validation.
- Optimize adsorption through composite materials or chemical activation
- Scale-up experiments to pilot treatment units for practical application.