



Isolation of Zinc Solubilizing Microorganisms and Evaluation of their Bio-efficacy on Wheat (*Triticum aestivum* L.)

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Abstract:

This study aimed to isolate zinc solubilizing microorganisms (ZSM) from agricultural soil and evaluate their bio-efficacy on wheat. Zinc deficiency is a major constraint in cereal production. Efficient isolates were screened based on halo zone formation and evaluated in pot experiments. Results indicated significant enhancement in germination percentage, shoot length, and biomass in inoculated plants. The findings suggest the potential application of zinc solubilizing microorganisms as sustainable biofertilizers.

Keywords: Zinc Solubilization, Wheat, Biofertilizer, Micronutrient Deficiency, Plant Growth Promotion, Sustainable Agriculture.

Introduction:

Zinc is an essential micronutrient involved in enzyme activation, auxin metabolism, protein synthesis, and chlorophyll production. Deficiency of zinc leads to reduced crop productivity, especially in wheat. Biological approaches using zinc solubilizing bacteria have gained importance as eco-friendly alternatives to chemical fertilizers.

Materials and Methods:

Soil samples were collected from agricultural fields and processed using serial dilution techniques. Isolation was performed on nutrient agar supplemented with insoluble zinc compounds. Colonies forming clear halo zones were selected for further evaluation.

A pot experiment was conducted to evaluate bio-efficacy. Surface sterilized wheat seeds were inoculated with selected isolates. Growth parameters were recorded after 30 days.

Results:

Four isolates showed significant zinc solubilization ability. Among them, ZSB-3 exhibited highest solubilization index

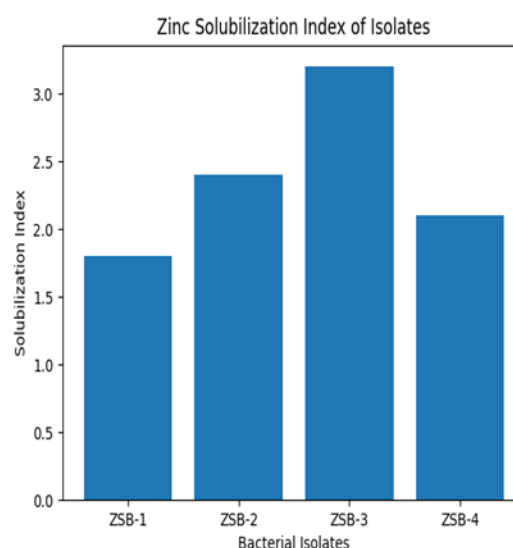


Figure 1: Zinc Solubilization Index of Selected Isolates.

Source: Experimental data from present study

Germination percentage increased significantly in inoculated treatments compared to control

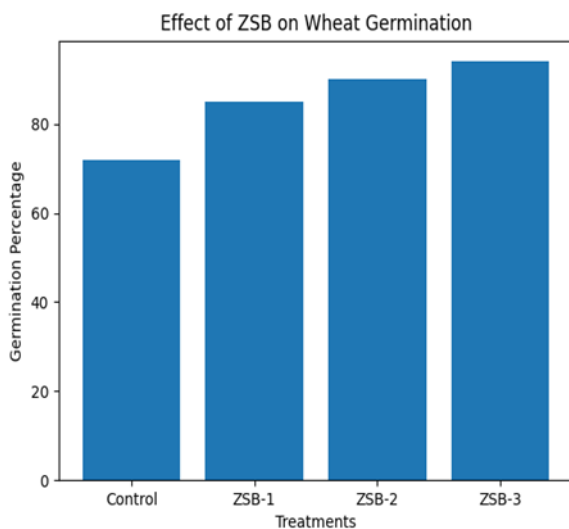


Figure 2: Effect of Zinc Solubilizing Bacteria on Wheat Germination

Source: Experimental data from present study

Shoot length was significantly higher in ZSB treated plants, indicating improved nutrient uptake.

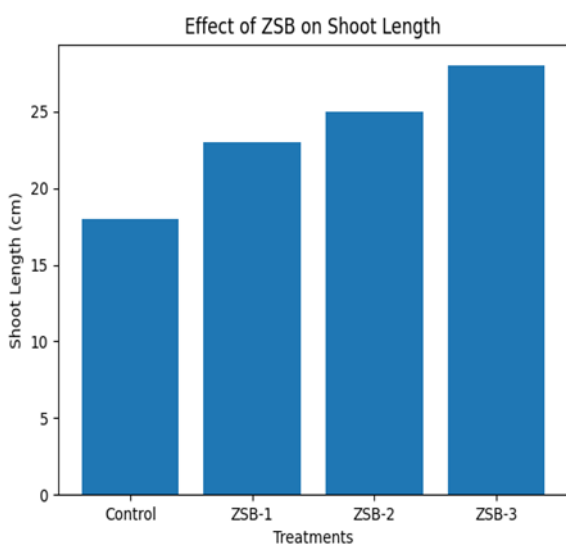


Figure 3: Effect of Zinc Solubilizing Bacteria on Shoot Length

Source: Experimental data from present study

Discussion:

The enhanced plant growth observed may be attributed to organic acid production and improved zinc availability. ZSB inoculation not only increases zinc uptake but also promotes overall plant vigor.

Conclusion:

The study confirms that zinc solubilizing microorganisms significantly improve wheat growth. These isolates can be developed as biofertilizer formulations for sustainable agriculture.

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