Screening for the Production of Antibacterial Compounds by *Pseudomonas* Species Isolated From Soil

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Introduction

The growing challenge posed by multidrug-resistant (MDR) bacteria has increased the worldwide need for novel antimicrobial agents. Microorganisms found in soil, especially *Pseudomonas* species, have surfaced as promising options due to their metabolic adaptability and capability to synthesize diverse of bioactive metabolites, reinforcing their status as major contributors to microbial drug discovery (Alexandra *et al*., 2024).Soil serves as the primary reservoir for antibiotic-producing microorganisms and acts as a complex and diverse environment, providing a broad source of such organisms (Ismail & Ahmed, 2021).

Methodology

Pseudomonas spp. was isolated and identified from soil samples harvested from the rhizospheric region of soybean, maize, and rice plants, as well as from compost soil.

The *Pseudomonas* were screened for antibacterial activity against *Staphylococcus aureus*, *Salmonella* Typhi, and *Vibrio cholerae*, utilizing spot inoculation.

Ethyl acetate extracts of metabolites produced by the Pseudomonas bacteria with activities were evaluated for antibacterial activity against *Staphylococcus aureus*, , *Salmonella* Typhi, and *Vibrio cholerae* using agar well diffusion assay.

Results and Discussion

Six *Pseudomonas* isolates were obtained, all of which demonstrated inhibitory activity against at least one of the test organisms, with IS-6 exhibiting the most significant effects.

This indicates that these isolates produce extracellular metabolites that can diffuse through the agar and suppress pathogen growth. The varied activity among isolates might result from differences in the composition, concentration of metabolites, and genetic regulation.

The crude metabolite extracts from the isolates also exhibited significant antibacterial effect, with measured zones of inhibition within the range of 6 mm to 42 mm.

Research by Amankwah et al. (2022) and Riera et al. (2023) has indicated that metabolites from *Pseudomonas* can effectively target Gram-positive bacteria. Additionally, the moderate effectiveness against *Vibrio cholerae* and *Salmonella* Typhi indicates a broad-spectrum activity. This is consistent with findings from studies in African soils, where Pseudomonas isolates demonstrated inhibitory actions against enteric pathogens (Bisht *et al*., 2025).

The differences in inhibition zones among the isolates emphasize the metabolic diversity within Pseudomonas spp.

Table 1: Preliminary Antibacterial Activity of the *Pseudomonas* Isolate Against V. *cholerae, S. aureus* and *S.* Typhi

Isolates	Antibacterial Activity Against		
	V. cholerae	*S. aureus*	*S.* Typhi
IS-1	-	+	+
IS-2	-	+	+
IS-3	-	+	-
IS-4	-	+	-
IS-5	-	+	-
IS-6	+	+	+

Table 2: Antibacterial activity of Extracted Metabolite Against *V. cholerae, S. aureus* and *S.* Typhi

Isolates	Zones of Inhibition (mm)		
	S. aureus	*V. cholerae*	*S.* Typhi
IS-1	23	20	8
IS-2	21	14	8
IS-3	18	14	6
IS-4	15	6	6
IS-5	35	22	15
IS-6	42	22	20

Conclusion

All the isolates exhibited significant inhibition against *V. cholerae*, *S. aureus*, and *S.* Typhi, and can serve as a source of novel therapeutic agents.

References

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