

Evaluation of Antibiotic Resistance in Soil Amended with Cow Manure

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Livestock manure is a potential reservoir for antibiotic-resistant (AR) bacteria. Recently, cattle manure from farms harbored AR genes (β -lactam antibiotics) despite the use of antibiotics. These AR genes can be transferred to pathogenic bacteria in soil via horizontal gene transfer and impose adverse effects on agriculture and human health. Therefore, this study was set up to explore whether soil amended with cow dung containing AR bacteria could induce AR bacteria in soil. Accordingly, untreated soil (pH 8.5, 78% moisture, brunette, friable) encompassing *Centella asiatica* in each tray was treated with cow dung with amoxicillin-resistant bacteria (ARB) and cow dung without ARB (2 kg/m²) separately and with NPK fertilizer (0.075 kg/m²). Soil without any fertilizer amendment was the control. These cow dung samples were previously screened for ARB using 96 well plate based assay. The experiment was conducted in a greenhouse to ensure all treatments were carried out under similar temperature and relative humidity. Soil samples from trays were screened every two weeks up to 16 weeks according to previously published work. To detect the presence of ARB, 96 well plate-based high-throughput assay and three susceptibility testing strains *Escherichia coli* (ATCC 25922), *Pseudomonas aeruginosa* (ATCC 25619) and *Staphylococcus aureus* (ATCC 25923) were used as controls followed by pour plate to determine the CFUs. Eighth week after treatments, the soil treated with cow dung containing ARB showed an increase in ARB relative to the control ($p < 0.001$), while, the amount of ARB in soil samples treated with cow dung without ARB did not show a significant increase ($p = 0.630$). Consequently, it can be argued that the proliferation of ARB is due to cow dung with ARB at least under the afore used soil conditions. Further, large-scale experiments are warranted before relating the afore mentioned findings to agriculture in Sri Lanka.

Keywords: Amoxicillin resistant bacteria, Antibiotic resistance, Cow dung, High-throughput-assay, Agriculture

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