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THE INFLUENCE OF ANTIMICROBIAL CHEMICALS ON HERBICIDE DEGRADING ORGANISMS

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ABSTRACT

Tylosin (Tyl) and chlortetracycline (CTC) are antimicrobial chemicals used as growth promoters in cattle, swine, and poultry production and can be excreted as the parent compound. Landspreading manure can move these chemicals into soil and thereby change the soil microbial make up or degradative activity. The objective of this study was to determine if Tyl and CTC changed the growth or herbicide degrading activity of pure cultures of two bacteria, *Pseudomonas* ADP, an atrazine degrader, and *Sphingobium herbicidovorans*, a 2,4-D degrader. The *P.* ADP was cultured in liquid minimal broth with atrazine as the sole N source for 5 d. Tyl or CTC was added to the media at 2.5 ppm. The culturable count was determined every 24 h. The activity of the *S. herbicidovorans* was measured over 14 d by placing ^{14}C -carboxy-labeled 2,4-D in a biometer flask and adding a 5 ml solution containing 3.7×10^9 CFU of the degrader. $^{14}\text{CO}_2$ generated by 2,4-D degradation was trapped in NaOH and radioactivity quantified by liquid scintillation counting. *P.* ADP in the control media grew well during the incubation. Tyl inhibited *P.* ADP temporarily and recovery occurred within 48 h. The CTC treatment killed *P.* ADP, as the culturable count was below the detection limit by 72 h. About 88% of the 2,4-D in control treatments was mineralized by *S. herbicidovorans* 4 d after treatment (DAT), whereas Tyl slowed the initial degradation with only 4% mineralized by 10 DAT. By 14 DAT, recovery occurred and 2,4-D mineralization in the Tyl treatment was similar to the control. CTC substantially decreased the activity of *S. herbicidovorans* with only 12% of the added 2,4-D mineralized 14 DAT.