



Title: Antagonism Between Chlorpyrifos and Flaxedil in Toad and Earthworm Neuromuscular Transmission

Author: Yong-Chiang Chang, Amauri B. Bartoszeck, Samir A. Madeira and Charles I. Abramson

Source: American J. of Environmental Sciences 2(2): 41-48 , 2006

Abstract: The cholinesterase inhibition effect of chlorpyrifos, a commercial insecticide, was tested by its antagonism to the acetylcholine inhibition effect of flaxedil in 30 isolated nerve-sartorius muscle preparations of the toad, compared with its antagonism in 30 isolated nerve cord-body wall muscle preparations of the earthworm. Inhibition and facilitation in this antagonism were measured by changes in depolarizing rate of toad endplate potential and in earthworm slow potential and by changes in interstimulus interval for evoking an action potential in toad preparations and a graded spike potential in earthworm preparations. Earthworm depolarizing rate ( $0.32 \text{ V s}^{-1}$ ) in its normal Ringer was five times lower than that ( $1.50 \text{ V s}^{-1}$ ) of toad under  $[\text{Flaxedil}]_o = 3 \times 10^{-3} \text{ g cc}^{-1}$ . Earthworm interstimulus interval (15.6 ms) in its normal Ringer was nine times longer than that (1.75 ms) of toad under  $[\text{Flaxedil}]_o = 3 \times 10^{-3} \text{ g cc}^{-1}$ .  $[\text{Flaxedil}]_o$  between  $3 \times 10^{-4} \text{ g cc}^{-1}$  and  $5 \times 10^{-4} \text{ g cc}^{-1}$  attenuated 25% of toad depolarizing rate and 23% of earthworm depolarizing rate, 60% of toad interstimulus interval and eliminated the earthworm interstimulus interval almost entirely. Enhancement of toad depolarizing rate and interstimulus interval by chlorpyrifos between  $5 \times 10^{-4} \text{ g cc}^{-1}$  and  $10^{-2} \text{ g cc}^{-1}$  after being attenuated by flaxedil was not significant but was significant in the earthworm preparation. Inhibition of earthworm cholinesterase by chlorpyrifos may be related to its lower neuromuscular excitability than that of the toad.