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Assessment of Toxic Impact of Metals on Different Instars of Silkworm, Bombyx Mori

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Abstract : Larvae of silkworm (Bombyx mori) exhibit very high mortality when reared on mulberry leaves collected from mulberry orchards which get contaminated with metallic/nonmetallic compounds through either drift-deposition or chemigation. There is need to screen out such metallic compound for their toxicity at their various concentrations. The present study was carried out to assess toxicity of metals in different instars of silkworm. Aqueous solutions of nine heavy-metal based salts were prepared by dissolving 50, 100, 150, 200, 250, 300, 350 and 400 mg of each salt in one liter of water and were applied on the mulberry leaves by leaf-dip methods. The results reveal that mortality in 1st, 2nd, 3rd, 4th and 5th instar larvae caused by each heavy metal salts increased with an increase in their concentrations. The 1st instar larvae were found more susceptible to metal salts followed by 2nd, 3rd, 4th and 5th instar larvae of silkworm. Overall, Nickel chloride proved more toxic for all larval instar as it demonstrated approximately 40-99% mortality. On the basis of LC2 and larval mortality, the order of toxicity of heavy metals against all five larval instar was Nickel chloride (LC_2 = 1.9-13.9 mg/L; & 15.0±1.2-69.2±1.7% mortality) followed by Chromium nitrate (LC_2 = 3.3-14.8 mg/L; & 13.3±1.4-62.4±2.8% mortality), Cobalt nitrate (LC_2 = 4.3-30.9; &11.4±0.07-54.9±2.0% mortality), Lead acetate (LC_2 =8.8-53.3 mg/L; & 9.5±1.3-46.4±2.9% mortality), Aluminum sulfate (LC_2 = 15.5-76.6 mg/L; & 8.4±0.08-42.1±2.8% mortality), Barium sulfide (LC_2 = 20.9-105.9; & 7.7±1.1-39.2±2.5% mortality), Copper sulfate (LC2 = 28.5-12.4 mg/L; & 7.3±0.06-37.1±2.4% mortality), Manganese chloride (LC_2 = 29.9-136.9 mg/L; & 6.8±0.09-35.3±1.6% mortality) and Zinc nitrate (LC_2 = 36.3-15 mg/L; & 6.2±1.2-32.1±1.9% mortality). Zinc nitrate @ 50 and 100 mg/L, Barium sulfide @ 50 mg/L, Manganese chloride @ 50 and 100 mg/L and Copper sulfate @ 50 mg/L proved safe for 5th instar larvae as these interaction attributed no mortality. All the heavy metal salts at a concentration of 50 mg/L demonstrated less than 10% mortality.

Keywords : heavy-metals, larval-instars, lethal-concentration, mortality, silkworm
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