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Does the aquatic herbicide 2,4-D and a nonionic surfactant affect survival of salvinia weevil?

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Chemical and biological control methods are often integrated to manage unwanted plants. However, the application of 2,4-D near giant salvinia (*Salvinia molesta* Mitchell) may hinder biological control efforts by the salvinia weevil (*Cyrtobagous salviniae* Calder and Sands). Limited efforts have been made to examine the susceptibility of salvinia weevil to direct and indirect applications of 2,4-D. The objectives of these studies were to 1) determine the direct and indirect impact of 2,4-D amine (0.62 and 1.85 g ha<sup>-1</sup>) and nonionic surfactant (0.25% v/v) on adult salvinia weevil survivorship, and 2) determine how different application rates of herbicide affect salvinia weevil survivorship. In a growth chamber experiment, the application of 2,4-D directly to salvinia weevil resulted in 9% mortality, whereas surfactant alone or in combination with the herbicide resulted in mean insect mortality of 21%. In a mesocosm experiment, the application of 2,4-D alone and in combination with surfactant to giant salvinia infested with the salvinia weevil resulted in 9 to 23% mortality, and the application of surfactant alone or in combination with herbicide resulted in 9 to 19% indirect mortality. Giant salvinia treated with 2,4-D resulted in a significant reduction in biomass relative to the nontreated plants. The mesocosm experiment provided evidence that 2,4-D alone and in combination with a surfactant has limited negative impacts on salvinia weevil mortality and future biological control programs should continue when using these methods together.