Nematicidal Activity and Saponin Concentration of Chenopod Extracts

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Nematodes cause significant economic losses in crop production throughout the world and can cause illness in humans and other mammals. The purpose of this study was to determine potential efficacy of extracts from plants in the family Chenopodiceae as natural pesticides. The plants are all closely related to quinoa and contain saponins, a group of chemicals known to be toxic to many harmful pests, but most are not damaging to plants or humans. Extracts were prepared by autoclaving the plant materials twice and filtering as necessary. Caenorhabditis elegans, a model organism, was used to test nematicidal properties of extracts. Extracts were applied to juveniles; percentages that had reduced mobility or were dead were determined at 24 and 48 hours. Extracts from Good King Henry had the greatest anti-nematodal activity (EC50 = 9.83). Field-picked Chenopodium berlandieri had the least effective (EC50 = 27.28). Fourier Transform Infrared Spectroscopy was used to compare chemical constituents of extracts; data were analyzed by principal component analysis. To determine relative saponin concentration of extracts, foaming capacity and hemolysis tests were performed. Foaming capacity and saponin concentration are directly correlated. Good King Henry had the strongest foaming capacity and the greatest response in hemolysis tests. Relative saponin concentrations were strongly correlated with anti-nematodal activity, except for epazote, which is known to also contain the chemical ascaridole. Extracts of epazote had the lowest foaming index but the second strongest anti-nematodal activity. Based on these data, chenopods, particularly Good King Henry, have potential as natural pesticides and medicinals.

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