



# University of Hawaii at Manoa

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September 25, 1987  
RG:0074

Mr. Ronald L. Walker, Acting Administrator  
Division of Forestry and Wildlife  
Department of Land and Natural Resources  
1151 Punchbowl Street  
Honolulu, Hawaii 96813

Dear Mr. Walker:

Final Report  
Soil and Vegetation Analysis  
After an Aerial Application of Weed Oil  
Island of Oahu

Again, we thank you for the courtesy copies of the above cited report analyzing the environmental impacts of helicopter application of weed oil on a variety of plants (marijuana excluded) under test controlled conditions. The report was circulated to the following University reviewers for their evaluation and comments: Clifford Smith, Botany; James Parrish, Hawaii Cooperative Fishery Research Unit; Barry Brennan and John Hylin, Agricultural Biochemistry; Frank Scott, Agricultural Economics; and Steven Armann, Environmental Center. The comments that follow represent a synthesis of the views expressed during their review.

### General Comments

Perhaps one of the most significant points recognized in the report was the documentation of drift even under the most controlled and modest conditions of this study. Errors in the application did occur (p. 10 last paragraph) and in fact the conditions under which they occurred may well be common. Our reviewers do not concur with the explanation that the plot was "atypical" of a "normal" marijuana planting site because the shrub canopy was intact. In their field investigations several of our reviewers reported seeing marijuana plots planted under the forest canopy so as to be concealed from aerial view. It is likely that mistakes in application will, if anything, increase during the longer term actual eradication efforts simply because of the increased scope of operations, the area involved, and the inability to predict or control short term climatic variables such as wind and rain.

It is disappointing that no study was conducted to follow-up the weed oil application to marijuana on the island of Kauai. It was our understanding that such a study was to be conducted and evaluated prior to

expansion of the program to the remainder of the state. We suggest that monitoring studies be conducted following actual weed oil applications on several marijuana planting sites. An accurate assessment of the environmental impacts of such eradication procedures requires more realistic and longer term testing than that offered by the present short-term Oahu study.

The time factor in the volatilization of weed oil cited in the California study (Woodrow, et al., 1986) may or may not be applicable to Hawaii. Certainly the ambient humidity would have a significant impact on the volatilization time of the oil. Since no information was given as to the climatic factors that prevailed during this study, the appropriateness of the use of California data to the Hawaii test is unknown. We understand that the wind currents created by the helicopter during the test application were greater than the ambient wind; however, wind speed should have been noted since it is a factor in evaporation and the pilots ability to control the application process.

The methodology section is weak and deficient in its description of the techniques used. The measurements should have been reported in standard units of concentration, not gross weights (page 41, line 1). Given the substantial variability in the Gas Chromatograph Test Results (Table 8), conclusions on the fate of weed oil in soil seem poorly supported.

On page 41, it is stated that because of the "great distance to the water table (roughly equivalent to a site's elevation at most locations), no measurable impact on groundwater quality can be projected". This statement should have been verified by quantitative data since geologic and hydrologic features in Hawaii frequently result in near-surface sources of groundwater. The high porosity of Hawaiian soils may allow more rapid penetration of weed oil. Furthermore, the figures provided in Table 7 appear to have little statistical significance.

The follow-up study took place two weeks after the application and found few impacts. Unfortunately, the suggested six month follow-up study was not undertaken. Since it is possible that some impacts may take longer than two weeks to become apparent, a six month follow-up study should have been conducted to confirm the results.

Thank you for the opportunity to review this study. We hope our comments will be helpful.

Yours truly,



Jacquelin N. Miller  
Associate Environmental Coordinator

cc: OEQC

L. Stephen Lau  
Clifford Smith  
James Parrish  
Barry Brennan  
John Hylin  
Frank Scott  
Steven Armann