

The Use Of An Amine Salt Of Endothall In Irrigation Canals

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INTRODUCTION

Submersed aquatic weeds in Western irrigation canals represent a major maintenance problem in the distribution systems of irrigation companies. Chemical control methods have largely replaced mechanical removal and, depending upon the region, from one to six or more applications of a herbicide are needed to maintain adequate flow of water throughout the season. Field experiments over the last four years have shown that the mono-N,N-dimethylcocoamine salt of 7-oxabicyclo[2.2.1]heptane-2,3-dicarboxylic acid (amine salt of endothall), when introduced into irrigation canals at 3 to 4 ppmw for a period of three hours, can provide commercially acceptable weed control of most species of submersed weeds for a distance of over 20 miles. Applications of 1 ppmw for nine hours have not provided consistent control in all areas. Irrigation of representative crops with irrigation water containing the amine salt at a concentration of 10 ppmw induces no injury. The objectives of the field studies were to determine the optimum concentration-time combination for application, under the conditions likely to be encountered in the irrigated West, and to ascertain the changes that occur in concentration as the application blanket moves downstream.

METHODS AND PROCEDURES

Several methods of application were used: (a) directly from the original five or 30 gallon container, using a gravity constant flow device; (b) diluted with water 1:1 when a minimum delivery is required in small laterals of 10 to 15 cfs, using the gravity constant flow device; (c) with syphon pumps inserted into the container, using water trucks where the herbicide was mixed with a measured amount of water; and (d) pumping directly from large tank amount of water. Concentration-time combinations varied from 1 ppmw for nine hours to 5 ppmw for five hours in an attempt to ascertain the combination providing the most consistent weed control under all of the conditions encountered. In an application of 3 ppmw for three hours water samples were collected at selected sites for residue

analysis to determine the extent to which the application blanket elongates in 20 miles and to measure the change in concentration. Irrigation of selected crops with this amine of endothall at 10 ppmw produces no injury and does not reduce yields.

RESULTS

Troublesome submersed aquatic weeds, particularly *Potamogeton pectinatus* L. (Sago pondweed), *P. nodosus* Poir (American pondweed), *P. foliosus* Raf. (leafy pondweed), *Zannichellia palustris* L. (horned pondweed), and *Alisma* species (water plantain) have been controlled for the entire length of canals as long as 20 miles, from a single point of application, with an application of 3 ppmw for three hours. Weed control has been observed in canals as small as 10 to 15 cfs, as well as in larger canals with a flow of 100 cfs. In Arizona, however, an application of 4 ppmw for five hours is necessary to achieve satisfactory weed control. This is attributed to hardness of water. Analyses of treated water indicate that the application blanket elongates several-fold over a distance of 20 miles, where the water velocity is approximately 1 mph (Figure 1).

It is general practice to reduce water flow in a canal to be treated in order to lower the cost of treatment. In some instances the time required for the application blanket to transverse the entire length of the canal has been underestimated, and the return to normal flow of water initiated too soon.

This has resulted in a dilution at the lower end of several canals, which in turn reduced the effectiveness of the herbicide. This can easily be prevented by introducing a dye at the termination of application. In Arizona, cotton has been irrigated in the field with this amine of endothall at a concentration of 10 ppmw for each of six irrigations throughout the growing season with no effect upon the yield.

Crops such as sugar beets, lettuce, beans, and alfalfa have received a concentration of 10 ppmw in each irrigation throughout their growing season with no apparent injury.

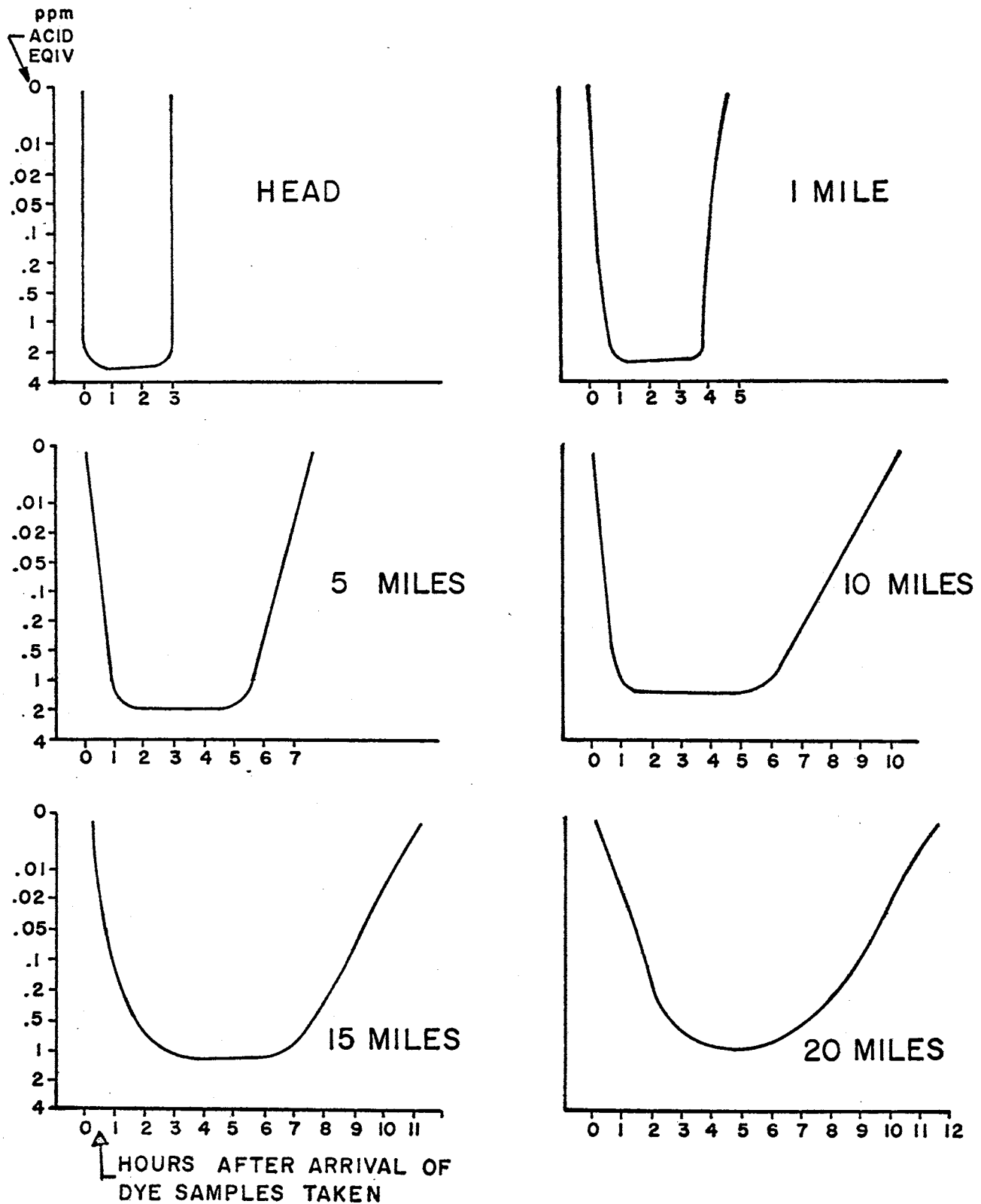


Figure 1. Typical exposure time versus concentration in a canal treated with hydrothol 191 at 3 ppm for 3 hours.