

CARBETAMIDE FAILURE DUE TO ENHANCED BIODEGRADATION IN AUSTRALIAN SOILS

S.J.W. Hole^A, S.B. Powles^A and N.C. McClure^B

^A University of Adelaide, Department of Crop Protection, Adelaide, South Australia 5064, Australia

^B Biological Sciences, Flinders University, Adelaide, South Australia, Australia

Abstract Carbetamide is a soil active herbicide registered for control of annual grasses in clover and medic seed crops in Australia. Following reports of carbetamide failure when used on an annual basis, we examined whether this herbicide was subject to enhanced biodegradation upon repeated application to soil.

A single prior application of carbetamide (twelve months earlier) reduced the soil half life of carbetamide from 54 d to 9 d. Therefore, carbetamide failure is due to rapid biodegradation in soils with a history of carbetamide use.

In soil exhibiting enhanced carbetamide degradation, propham was also degraded at an enhanced rate

(cross enhancement). Cross enhancement was not evident to chlorpropham, EPTC, propyzamide, diuron or simazine.

In order to determine the biological basis for enhanced carbetamide biodegradation, soil was treated with antibacterial and antifungal agents. Enhanced carbetamide biodegradation was inhibited by the antibacterial chloramphenicol. This suggests that enhanced carbetamide degradation is due to the presence of an elevated population of soil bacteria that can utilize carbetamide and/or energy. A pure strain of bacteria has been isolated from soil which can degrade carbetamide and utilize the products for growth.