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COTTON RESEARCH COUNCIL

PROJECT REPORT 1990

PROJECT:REDUCING PESTICIDE PERSISTENCE IN AGRICULTURAL SOILS

PROJECT NUMBER:US1L

The aim of the project was to test the feasibility of using DNA probes to enumerate microorganisms involved in the degradation of herbicides in soil. The ultimate goal of this approach was to use such data to predict the herbicide degradation potential of agricultural soils which could form part of an overall herbicide application strategy for a wide variety of cropping systems.

To develop the techniques one of the the degradation pathways of the herbicide 2,4-D was used. In Alcaligenes eutrophus, a soil bacterium, the genes for this pathway are encoded on a plasmid, pJP4, for which some genetic data was available. DNA probes were constructed for several individual genes and for particular gene combinations. Such probes, labelled with $^{32}P$, were intially used in conjunction with colony hybridization techniques using soil dilution plates. This approach showed potential for qualitative investigations, such as identifying organisms carrying degradative genes but, because of the difficulties in accurately quantifying true probe-positive organisms, a Most Probable Number enumeration method was adopted. Results obtained using this technique have correlated well with other, traditional methods and work is currently underway to attempt to correlate the abundance of probe-positive microbes with the 2,4-D degradation potential of a variety of agricultural soils in NSW.