INTRODUCTION

Soils contain a wide variety of representatives of both the plant and animal kingdoms that are microscopic or nearly so in size. These organisms may be sparsely present or they may number in the millions per gram of soil. They are responsible for decay of organic materials and for transformations of nitrogen and other mineral nutrients. They contribute to the chemical and physical properties of soils. Some affect plant welfare by causing or controlling plant diseases. Consequently, qualitative and quantitative determinations of their presence and activities in soil frequently appear desirable.

These determinations can be accomplished in several ways. In cultural methods, soil particles or appropriately dilute soil suspensions are placed on or in solid or liquid substrates suitable for the growth of the organisms. With growth, the seeded organisms produce sufficient turbidity, distinctive pigmentation, gaseous products, substrate changes, or total cell material to be macroscopically visible or otherwise measurable. Additionally or alternatively, direct microscopic and macroscopic examinations may be employed to determine the soil life. These include direct enumeration and direct staining techniques, variously combined with dilution, flotation, screening, or entrapment procedures. Finally, chemical determinations of substrate changes may at times be highly informative of the extent of microbial activity in the soil, even though the microorganisms themselves are not specifically determined by either cultural or direct microscopic methods.

Of the cultural methods for determining the total microbial population in soil, the agar-plate method has been the most widely used. This method also has long been used for determining the microbial content of soil runoff, water, sewage materials, agricultural commodities, and foods prepared for human consumption. The general technique employed is common for all

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