SEASONAL VARIATION OF NITRATES IN WILLAMETTE VALLEY SOILS AS INFLUENCED BY LIMING AND CROPPING

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INTRODUCTION

The maintenance of an ample supply of nitrates for growing crops has been regarded generally as the most pressing requirement of any system of soil fertility. It is recognized, however, that nitrates may be supplied in abundance and yet crop yields may be unsatisfactory because of other limiting plant food elements or lack of moisture. Systematic studies of the nitrate content of field soils and laboratory tests on the nitrifying powers of these soils are essential in establishing the efficiency of any system of soil fertility for maintaining an ample supply of nitrates.

Each section of the country with its characteristic climatic and soil conditions presents a problem which cannot be satisfactorily solved by adopting practices and systems of management employed in other regions. An adequate supply of organic matter may be in the soil as a source of nitrates, but unfavorable soil conditions, such as moisture, temperature, or soil reaction may retard biological activity, making it too slow to supply an adequate amount of nitrates. Commercial forms of nitrogen must then be applied to meet the needs of the crop.

PURPOSE OF INVESTIGATION

The purpose of this investigation was to study the amount of nitrate produced in cropped and uncropped soils of the Willamette Valley, to determine the relation of lime to the amount of nitrates present, and to observe the seasonal variations that occur. The data herein reported were obtained from the rotation plats of the Oregon Agricultural Experiment Station at Corvallis. The soil is known as Willamette silty clay loam and is one of the most prominent soil types of the Valley. Probably 85% of it is under cultivation and the rest, mostly confined to the vicinity of streams, supports valuable forests of fir. This soil has a lime requirement of approximately 2 tons per acre and a pH value of approximately 5.4.

Management of Willamette Valley soils presents a difficult problem. More than 40 inches of rainfall annually would naturally classify the Willamette Valley as a humid region. The distribution

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