

CHAPTER I
INTRODUCTION

I.1 Purpose

To determine the half-residence time, pattern of movement and distribution of tritium as tritiated water in soil and plant systems. This research will provide information on the behaviour of tritium when released as tritiated water into agricultural environments, and also will provide basic data on the ecological movement of water in agricultural ecosystems.

I.2 Background

Tritiated water, which is generally indicated with the letter HTO is released to atmosphere from a variety of sources, including nuclear power reactors, fuels processing plants, weapon testing and in the future, fusion power generation. The rates of uptake and loss of tritiated water in vegetation in the field after the plants have been exposed, are measured. The present public concern for the environmental effects of nuclear facilities creates the need for field data which can demonstrate the environmental impact of nuclear facilities. Furthermore, there is a need for ecological data which would

enable the estimation of public exposure to tritium through food chains in the event of an accidental release to the atmosphere. Such data will also provide the necessary information to describe the radiobiological effects of the release in terms of radiation dose to man.

I:3 Method of Approach

This research has to be carried out in the field and in the laboratory as well. In this connection, a field experiment was conducted on agricultural vegetation to which was applied a known dose of tritiated water of adequate concentration to permit effective measurement to the plot, with a small garden sprayer. This will introduce the tritium into the ecosystem. After the tritiated water has been applied, the vegetation and the soil at various intervals of the time of the experiment are sampled. The collected samples must be put in plastic bags, sealed and frozen as soon as possible, then transferred to a cold freezer chamber for storage until analysis. Tissue water (tritiated water) was extracted from the samples using a vacuum freeze-dry apparatus. The tissue water was counted for tritium by standard liquid scintillation techniques.