CHAPTER 1

INTRODUCTION

AIMS AND OBJECTIVES

1.1 INTRODUCTION:

An important reserve for raising the productivity and increasing the gross output of agricultural products, is the elimination of losses of the harvest due to pests, diseases and weeds. Indeed the biological factors mainly by animals and insects, lead to the losses of a major portion of the world's harvest.

The elimination of such significant losses is achieved by integral pest management, including agro-technical, quarantine, physical, mechanical, biological and chemical methods. Now-a-days, the chemical methods are more preferable.

The chemical protection of plants is based on the use of various organic and inorganic compounds, toxic to harmful organisms. Now, the pesticides are the best means of plant protection for their high universality. They can be used to control most plant diseases and weeds on all agricultural crops and various lands and also to treat granaries, storage bins, green-houses, grain elevators and other structures.

These pesticides are found in our countries as different chemical compounds in different formulations. According to their chemical compositions and occurrence, the pesticides are classified in many groups i.e. inorganic and
organic compounds. Organic compounds are many in nature. These are grouped primarily as pesticides of vegetative, bacterial and fungal origin (pyrethrins, bacterial and fungal preparations, antibodies and phytocides). The other organic compounds are the most extensive group including pesticides having high physiological activities, i.e. organochlorine (hexachlorocyclohexane (HCH), toxaphene, heptachlor, endosulphan etc.), organophosphorous group [Dichlorvos, parathione, methyl, malathion, phosmet, thimet (phorate) etc.] and carbamates (Zineb, metiram, thiram etc.).

At present, the pesticides have become a man-made pollutant as these chemicals are transferred outside the area of international applications and persist in the environment longer than necessary. This causes contamination of air, water, soil and foodstuffs which lead to health hazards.

Most of the experimental studies have revealed that the use of pesticides is not only associated with their accumulation in different tissues of the body but when their concentrations reach to a critical level, they create various hazardous effects. The hazard caused by organochlorine pesticides is more intense than organophosphates, carbamates and other synthetic biocides because of their longer persistence in the environment. Although, the utilization of organochlorine pesticides in many developed countries has become restricted, however the use of organophosphorous and other compound is increasing enormously. Recent studies, have indicated that most of the pesticides adversely affect different systems of man and animals.
The deleterious effects of different organochlorine pesticides on reproduction is now well established. However, the effect of organophosphorous pesticides having different formulations has not been well documented on reproduction.

In the present thesis, an attempt has been made to evaluate the effect of thimet (phorate), an organophosphorus insecticide, on the reproductive functions in rat.

The choice of thimet (phorate), as a representative of organophosphorus pesticides, is mainly due to its random use in agriculture in India.
1.2 AIMS AND OBJECTIVES

From the literature survey, followed latter, the widely used insecticide thimet (phorate), reveals a little about antigonadal property. But the prime objective of this thesis is to explore the exact mechanism of action of thimet on testicular functions in rats i.e. steroidogenesis, spermatogenesis and androgen production and pituitary gonadotrophin secretion.

The following objectives have been suggested to explore the action of thimet on male albino rats -

1. The minimum effective dose of thimet was selected on the basis of its effect on the activity of the testicular steroidogenic enzymes with least toxic effect.

2. The least toxic effect was evaluated following the changes in body growth rate and other related organ weights i.e. kidney, liver, spleen and adrenal.

3. The steroidogenic status has been evaluated by studying the changes in the activity of 3β-hydroxysteroid dehydrogenase (HSD) and 17β-HSD enzyme histochemically and biochemically.

4. The radioimmunoassay of plasma testosterone and gonadotrophins further supported the steroidogenesis in thimet treated rats.

5. The study of the spermatogenic pattern at stage VII of the seminiferous epithelium cycle of adult male wister strain rat was undertaken to indicate the state of spermatogenic activity of the testis. The duration of one cycle of the
seminiferous epithelium in wister strain rats is approximately 13 days. Thus the treatment of thimet was scheduled for 13 days (one cycle) and 26 days (two cycles) duration.

6. Some of the biochemical experiments, such as total cholesterol, ascorbic acid, acid and alkaline phosphatase and fructose level in the accessory organs were performed to provide as supportive evidences regarding testicular steroidogenesis.

7. Relative weights of testis and sex accessories and also Leydig cell nuclear and seminiferous tubular diameter were recorded for further confirmation of steroidogenic activity of the testis.

8. The role of HCG and testosterone on thimet induced changes in testicular histology was investigated to find out the mode of action of thimet either directly on testicular germ cells or through suppression of the testicular steroidogenesis. Ascorbic acid treatment to the thimet induced rat explains that testicular ascorbic acid depletion is also a cause of steroidogenesis diminution.

9. Lastly, the withdrawal of thimet treatment highlights the idea of stability, degradation and or rate of excretion of the insecticide from the body.