Kumar, Rajesh (2008). Development of immunobiosensor for prsticide detection. Ph.D. Thesis. CSIR-IMTECH, Chandigarh/ Jawaharlal Nehru University, New Delhi: India.
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SUMMARY OF THE THESIS

I decided to write my thesis divided into various chapters for my own convenience and hope to make my point clear during the course of writing this manuscript. Each chapter is complete in itself; with its own Introduction also containing related review of literature, Aims and objectives posed for each part of the study dealt with in the chapter, Materials and methods used and finally Results and discussion. I also decided to give bibliography separately for each chapter, due to which repetition of some of the references was unavoidable, but I chose to go ahead with this due to the overall convenience of writing. A brief description of current study dealt within different chapters is as follows

Chapter One: This chapter gives insight into the pesticide pollution problem encountered globally and sheds light on the problems associated with uncontrolled use of pesticides in developing countries like India. The current conventional methods and their limitations for use in environmental monitoring are discussed along with the need for development of better methods for environmental monitoring. The utility of biomolecular assays and scope of biosensors in environmental monitoring is stressed. Finally the chapter defines the overall objective of the current study and shed light on the methodology adopted to achieve the final goal of developing immunobiosensors.

Chapter Two: This chapter deals with the proposal of hapten structures for the target pesticide molecule i.e., parathion and atrazine. The hapten structures are characterized by various biophysical techniques. The chemical synthesis and purification of the haptens is described. The confirmation of the structural similarity of the chemically synthesized haptens was done using various methods such as UV-Visible, H^1-NMR and IR spectroscopy.

Chapter Three: This chapter encompasses the preparation and biophysical characterization of immunoreagents. Preparation of carrier protein-hapten conjugates, Hapten-label tracer molecules are dealt with in this chapter. The prepared conjugates were characterized in terms of gross structural changes and also change in the activity of labels after conjugation with hapten molecules. The utility of various biophysical methods such as spectroscopy including IR and UV-Visible method for structural changes, Electrophoresis and Mass spectrometric methods for determination of hapten densities and comparison with conventionally used chemical methods is studied.

Chapter Four: The fully characterized immunoreagents were checked for their biological activity in this chapter. The immunogens prepared were used for production of anti-amino parathion and anti-atrazine antibodies by immunization of rabbit as animal models. The antibodies produced using hapten-carrier conjugates were compared in terms of cross-reactivity with other pesticides having similar structure. Bulk purification methods were used for preparation of highly specific IgG polyclonal antibodies.

Chapter Five: Development and optimization of Immunoassay and Immunosensors is described in this part of the study. Optimization of ELISA assay for sensitive detection of amino parathion and atrazine is described using different coating antigens and antibody combinations. The conditions for best sensitivity and selectivity were optimized.

Chapter Six: The final chapter of the thesis summarizes the results and conclusions that can be drawn from the discussion of the results obtained from each part of the study. The current study is concluded with a discussion of future prospects in the field of immunobiosensor development.