

PREFACE

The thesis entitled, “synthesis of new organotin (IV) derivatives of thio-semicarbazides and S, N, O containing related ligands: characterization and studies on the biocidal properties of the new compounds with special reference to their agricultural applications” has aimed to explore the chemistry of simple organotin(IV) thio-semicarbazides and other related compounds. The work has been divided into five chapters.

Chapter 1

This chapter describes a brief review on the nature of bonding, other related properties including biocidal properties of the organotin compounds.

Chapter 2

This chapter describes the synthesis and characterization of Mn(II), Fe(II), Co(II), Cu(II) and Zn(II) complexes 3-5, dinitrobenzoic acid. The complexes were characterized by UV-Vis, IR and elemental analysis. Magnetic moments studies and differential scanning calorimetric measurements were carried out for these complexes. The X-ray crystallography studies were carried for Co(II) and Cu(II) complexes. The biological activity of some of the compounds against two fungal pathogens namely (*Lasiodiplodia theobromae* and *Crucularia eragrostidis*) which were isolated from two different crops (a pathogen of mango, *Magnifera indica* and a pathogen of tea, *Camellia sinensis*) respectively were undertaken to demonstrate their fungicidal activity. The phytotoxic effects of these compounds were also investigated against *Oryzae sativa* cultivar Khitish.

Chapter 3

In this chapter, the synthesis and characterization of tri- and di-organotin(IV) complexes of the ligand 2-mercapto isothiocyanate are described. All the compounds were characterized by IR, (¹H and ¹³C) NMR spectroscopy along with the elemental analysis. Further differential scanning calorimetric measurements were also carried out. Biological studies for some selected complexes were carried out and summarized in chapter 5.

Chapter 4

This chapter describes the synthesis, characterization, fluorescence and biological properties of diorgano tin(IV) compound of Schiff bases derived from salicylaldehyde/substituted salicylaldehyde and thiosemicarbazide/ substituted thiosemicarbazide. The complexes were characterized by UV-Vis, Fluorescence, IR, (^1H , ^{13}C and ^{119}Sn) NMR spectroscopy and elemental analysis. The solid state structures of some of these complexes were studied by X-ray crystallography. Differential scanning calorimetric measurements were carried out for some of these complexes. The biological activity of some of the compounds against six fungal pathogens namely (*Bipolaris sorokiniana*, *Helminthosporium oryzae*, *Alternaria brassicae*, *Alternaria kikuchiana*, *Stemphylium pori* and *Colletotrichum capsici*) isolated from six different crops (*Triticum aestivum*, *Oryzae sativa*, *Brassica nigra*, *Brassica oleracea*, *Allium cepa* and *Capcicum annum*) were examined to demonstrate their fungicidal activity. The phytotoxic effects of these compounds were also investigated against five economically important crops such as (*Triticum aestivum*, *Oryzae sativa*, *Brassica nigra*, *Brassica oleracea* and *Capcicum annum*).

Chapter 5

This chapter deals with the biocidal properties of tri- and di-organotin(IV) compounds of 2-mercapto isothiocyanate and di-organotin(IV) compounds of Schiff bases derived from salicylaldehyde /substituted salicylaldehyde and thiosemicarbazide/ substituted thiosemicarbazide. Also some reported compounds were studied for effective control of *Bipolaris sorokiniana* the casual agents of foliar blight disease of wheat was reported in the cultivar of Sonalika. Further, the mechanism of action of these compounds on host physiology in respect of phenolics pathogenesis-related protein, enzyme such as polyphenol oxydase, peroxidase and phenyl alanine ammonia lyase and other biochemical parameters commonly associated with diseases resistance was registered. Finally the effect of these compounds on seedling growth and yield parameters were described. Additionally the fungitoxic effects of these compounds were also reported against two important fungi of wheat such as *Alternaria titricina* and *Fusarium solani*.