**Abstract**

In this thesis, the complexes of Zn(II) with amino acid ligands, [Zn(Gly)2], [Zn(Gln)2], [Zn(His)2], [Zn(Arg)2(OAc)]OAc∙3H2O, [Zn(Met)2] and [Zn(Cys)2] (where Gly = Glycine, Gln = Glutamine, His = Histidine, Arg = Arginine, Met = Methionine and Cys = Cysteine), have been prepared and characterized by elemental analysis, FT-IR and UV-Vis spectroscopies. The solid state structure of [Zn(Arg)2(OAc)]OAc∙3H2O and [Zn(Gln)2] complexes were determined by single crystal X-ray crystallography. The colourless crystals of [Zn(Arg)2(OAc)]OAc∙3H2O were grown by slow evaporation of propanol/water solution of the complex. The complex was crystallized in monoclinic crystal system with *P21* space group. Single crystal structure showed that the coordination geometry around Zn(II) was distorted square pyramidal. The basal positions of the pyramid have been occupied by two Arg ligands as bidentate chelate with a similar configuration. One acetate ligand has been coordinated in apical position of pyramid *via* an oxygen atom. The crystals of [Zn(Gln)2] were grown by ethanol diffusion into an aqueous solution of the complex. Single crystal structure showed that the coordination geometry around the Zn(II) was a distorted octahedron. The Gln ligands are coordinated to Zn(II) ions through the carboxylate and amine groups in the equatorial positions. Two axial positions are occupied by neighbouring Gln molecules *via* the carbonyl oxygen atom; therefore this complex has a polymeric structure. The FT-IR spectra of the ligands and the complexes showed that the carboxylate and amine bands of the amino acid ligands are shifted to higher frequencies. Electronic spectra of these complexes were taken in water.

The effect of the complexes as inhibitors of fungal growth and aflatoxin production by Aspergillus flavus was investigated in six periods of biological experiments. In each set of experiments, the solutions with different concentrations of water-soluble complexes were added to PDA medium containing spores of Aspergillus flavus. The culture mediums were placed in the incubator for 6 days at 25-30 ° C. The amount of aflatoxin produced *in vitro* in the presence of different concentrations of these complexes was changed significantly. Generally, with increasing concentration of each of the complexes, there was almost no growth of the fungus Aspergillus flavus and the amount of aflatoxin produced was minimal. The toxin produced by the fungus in culture medium was measured using ELISA

**Key word**

Zn(II) complexes, Amino acids, Crystal structure, Aspergillus Flavus, Aflatoxin