

Name of the Scholar: **TALAT PARWEEN**

Name of the Supervisor: **PROF. TASNEEM FATMA**

Name of the Co-Supervisor: **DR. MAHMOODUZZAFAR**

Department: **BIOSCIENCES**

Title of the thesis: **EFFECT OF AGROCHEMICAL POLLUTION ON GROWTH, STRUCTURE AND SOME PHYSICOCHEMICAL ASPECTS OF *Vigna radiata* L.**

ABSTRACT

Pesticides were introduced to agriculture to fulfill the increased food needs of the growing global population. Due to long persistence, bioaccumulation and potential toxicity towards non target organism, organochlorine pesticide has been replaced by a relatively less persistent organophosphate pesticide. Chlorpyrifos (O, O-diethyl O-(3, 5, 6-trichloro-2-pyridyl) phosphorothioate), is one such organophosphate insecticide effective against a broad spectrum of insect pests of economically important crops. The application of an insecticide is a common practice in the cultivation of mungbean (*Vigna radiata* L.). To assess chlorpyrifos-induced toxicity in plants, we performed the experiment focusing on different parameters of green gram (*Vigna radiata* L.). Twenty day old plants were subjected to chlorpyrifos at concentrations ranging from 0-1.5 mM through foliar spray in the field condition and were studied at pre-flowering (5 Day After Treatment, DAT), flowering (10 DAT) and post-flowering (20 DAT) stages of plant development. Morphological parameters such as root length, shoot length, plant height, number of branches per plant, leaves per plant, total leaf area, plant biomass and yield attributing characters like number of pods plant⁻¹, number of seeds pod⁻¹ and weight of 100 seeds were analyzed from both control and treated plants. All the growth

parameters and yield parameters increased at 0.3 mM insecticidal treatment, when compared with control. Further increase in insecticide level had a negative impact upon all parameters studied. In the physiological and biochemical parameters low concentration (0.3 mM) of chlorpyrifos proved stimulant for Chl *a*, Chl *b*, Total Chl, carotenoid content, nitrate content, nitrate reductase (NR) activity, soluble sugar content and soluble protein content whereas increase in soluble amino acid were observed in age and dose dependent manner. In the oxidative stress, lipid peroxidation, enzymatic and non enzymatic parameters were studied. Content of lipid peroxidation rate (TBARS contents), dehydroascorbate (DAsc), oxidized (GSSG) and total glutathione (GSH+GSSG) were all ascended. Chlorpyrifos enhanced lipid peroxidation rate with 1.5 mM at 20 DAT whereas DAsc, GSSG and total glutathione (GSH+GSSG) were accumulated in 1.5 mM at 10 DAT. However, dose dependent significant declined in content of ascorbate (Asc) and reduced glutathione (GSH) were observed at all growth stage. Among the enzymatic antioxidants, activities of superoxide dismutase (SOD), ascorbate peroxidase (APX) and glutathione reductase (GR) enhanced significantly in all the concentrations at 10 DAT. Maximum catalase (CAT) activity was observed at 10 DAT in control and thereafter declined. In the elemental analysis, sulphur was most susceptible to chlorpyrifos than carbon and nitrogen. The electrophoretic pattern of mungbean using SDS-PAGE shows the pattern bands of 55 kDa on the gels were stained more intensely at the lower concentration (0.3mM). Residual analysis of chlorpyrifos in seeds of *Vigna radiata* L. using GC-MS showed no chlorpyrifos residues even at low concentration.