

ASSESSMENT OF THE OXIDATIVE STRESS AND BIO-TRANSFORMATION ENZYMATIC EFFECTS OF GLYPHOSATE EXPOSURE ON THE PACIFIC WHITELEG SHRIMP *PENAEUS (LITOPENAEUS) VANNAMEI*

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ABSTRACT : Naturally, aquatic organisms have self-defense mechanisms that protect them from the actions of chemicals such as the herbicide and antimicrobial Glyphosate. The changes in expression levels of different types of enzymes could be used as biomarkers of exposure such as hepatopancreatic cytochrome P450-associated enzyme activity. It is also possible that the rate of release of reactive oxygen species (ROS) increased during exposure and the defense mechanisms occurred in the cell because of rapid oxidation, reduction, hydroxylation and dealkylation reactions. Glyphosate 41 % S.L.(I.P.A salt), which was manufactured by Monsanto India Limited, Mumbai, India. Total quantity of this herbicide bottle is 500 ml which was purchased from theni district, Tamilnadu. The 41 % glyphosate make up to 100% for stock then serially diluted the different concentrations. The effect of Glyphosate exposure was examined to assess the oxidative stress and biotransformation on *P. vannamei* post larval stage (PL12–PL15) were collected from commercial farm near pattukottai, Thanjavur District, Tamilnadu and acclimatized for one day after the experiment were started. After measuring body length (1.760 ± 0.197 cm) by used verniorcolibor and weight (0.629 ± 0.081 g) they were divided into groups (n=25/tank): control, 10ppm, 20ppm, 30ppm, 40ppm, and 50ppm glyphosate concentrations for 24 hours. Water quality was maintained at a pH of 7.8, salinity of 28 to 32ppt and temperature of 27-28°C throughout the study. Tissue samples were collected every 6hr and the hepatopancreas removed for enzymatic reactions. The levels of antioxidant [superoxide dismutase (SOD), catalase (CAT) and glutathione reductase (GR)] and biotransformation enzymes (CYP450 isoform-EROD, MROD, BROD and GST) increased at 6hr and 12hr in the 10-30ppm groups, their activity decreased afterwards. In the 40-50ppm groups, the antioxidant and biotransformation enzymes increased up to 24hr. Results suggested that (a) antioxidant enzymes were elevated at early stages of exposure in 10-30ppm groups, (b) GSH, SOD and CAT play a role against ROS and neutralized it, (c) enzymatic biotransformation is essential to eliminate glyphosate and (d) the cellular enzyme defense mechanism protect shrimp at certain levels of exposure.

Key words :

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INTRODUCTION

The pesticide used wide range of compounds including insecticides, herbicides, weedicides, fungicides, rodenticides, nematicides and others. The organochlorines were banned or and restricted their usages after the 1960s in most developed countries. The introduction of other synthetic insecticides–organophosphate (OP) insecticides in the 1960s, carbamates in 1970s and pyrethroids in 1980s and the introduction of herbicides and fungicides in the 1970s–1980s contributed greatly to pest control and agricultural output (Wasim *et al*, 2009). Moreover, we concluded that the pesticides are lethal to targeted

organisms but other species. Unfortunately, other non-targeted species are affected direct or indirectly. The direct affect showed the lethality or vital organ toxicity such as liver, kidney, intestine and gill in aquatic organisms whereas the indirect effect mainly the endocrine disruption in aquatic organism. This trace level concentration mimic as a natural hormone, it may erupt or suppress the physiological function of the organism (Subramanian and Amutha, 2006; Amutha and Subramanian, 2013). As a result of these organism going to be unisexual either all male or all female population, subsequently at one point extinct that particular species.