



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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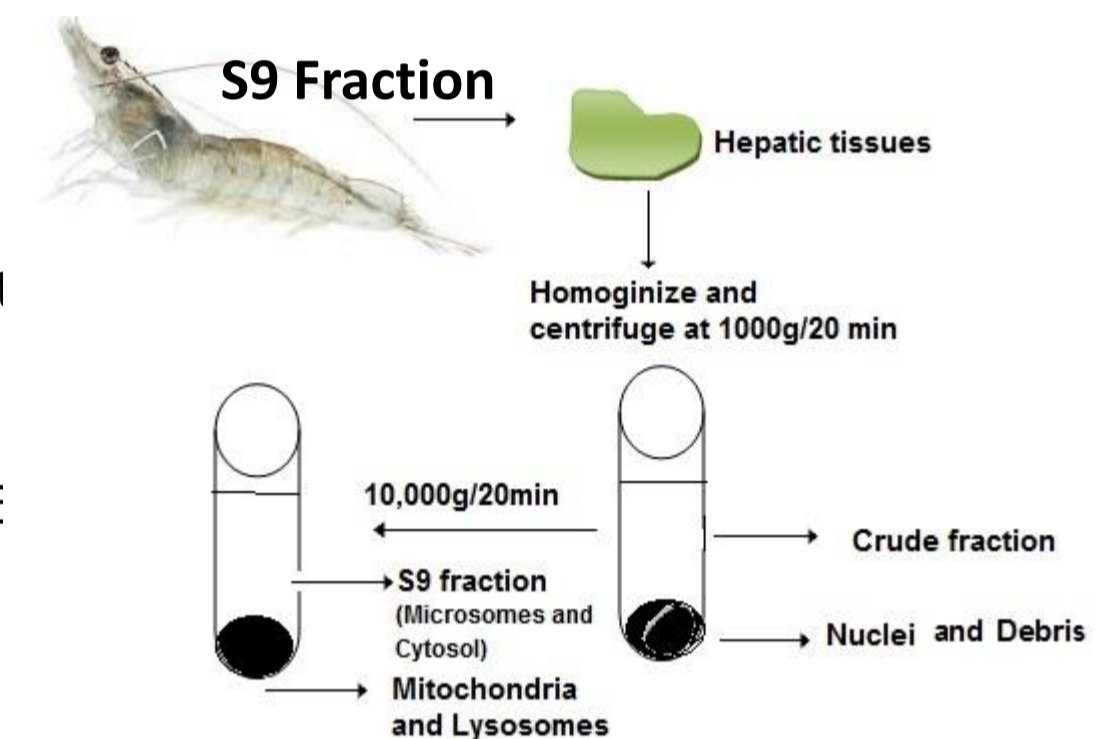
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I. Introduction

Naturally, aquatic organisms have self-defense mechanisms that protect them from the actions of chemicals of concern 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 hepatic cytochrome P450-associated enzyme activity. At the same time, it's possible that the rate of release of reactive oxygen species (ROS) is increased during exposure and the defense mechanisms occurred in the cell because of rapid oxidation, reduction, hydroxylation, dealkylation reactions. A study was performed to examine the effect of Glyphosate exposure to assess the oxidative stress and biotransformation of the Pacific whiteleg shrimp *Penaeus (Litopenaeus) vannamei*. The antioxidant enzymes (superoxide dismutase (SOD), catalase (CAT) and glutathione reductase (GR)) and biotransformation enzymes levels (CYP450 isoform-EROD, MROD, BROD and GST) increased at early hour duration i.e., 6hr to 12hr at 10ppm to 30ppm glyphosate concentrations after that declined their activity whereas the 40ppm to 50ppm exposed hepatopancreas showed the elevation of antioxidant and biotransformation enzymes levels up to 24hr duration

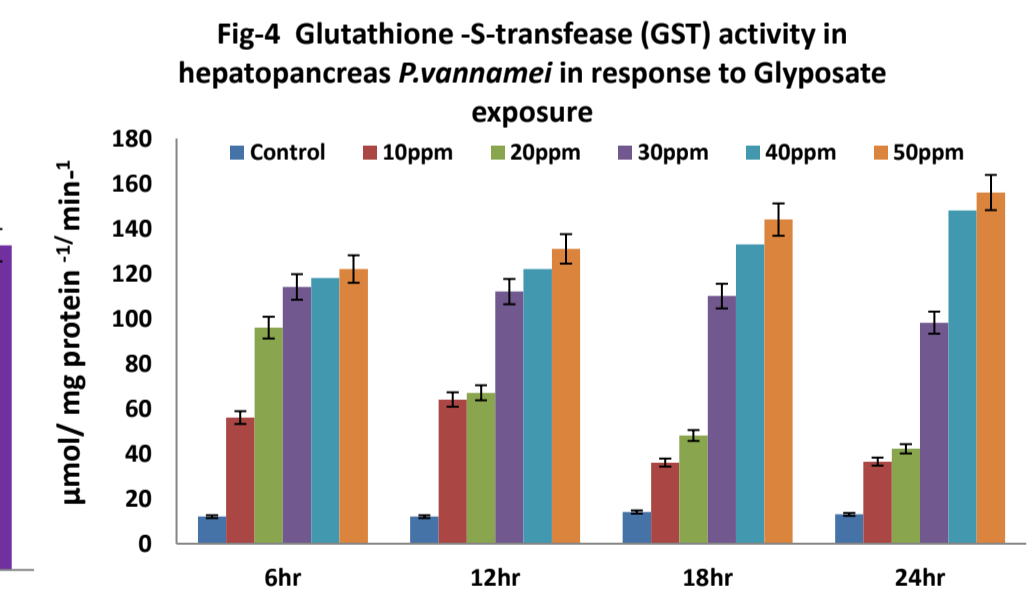
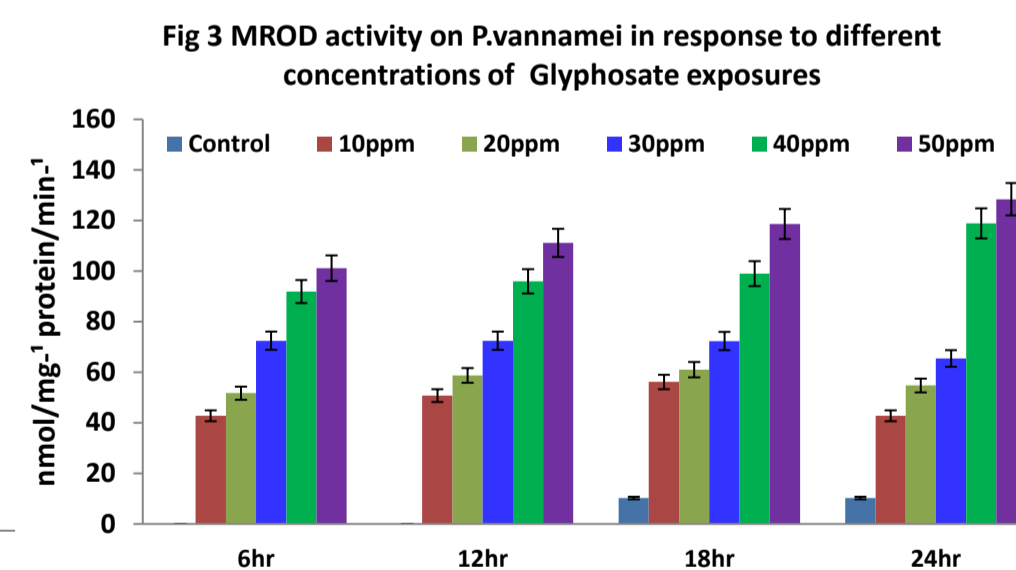
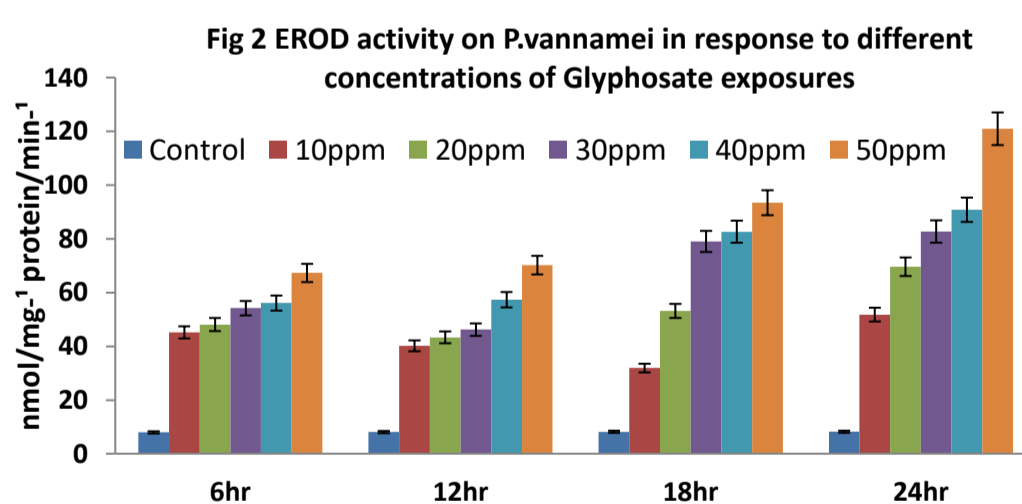
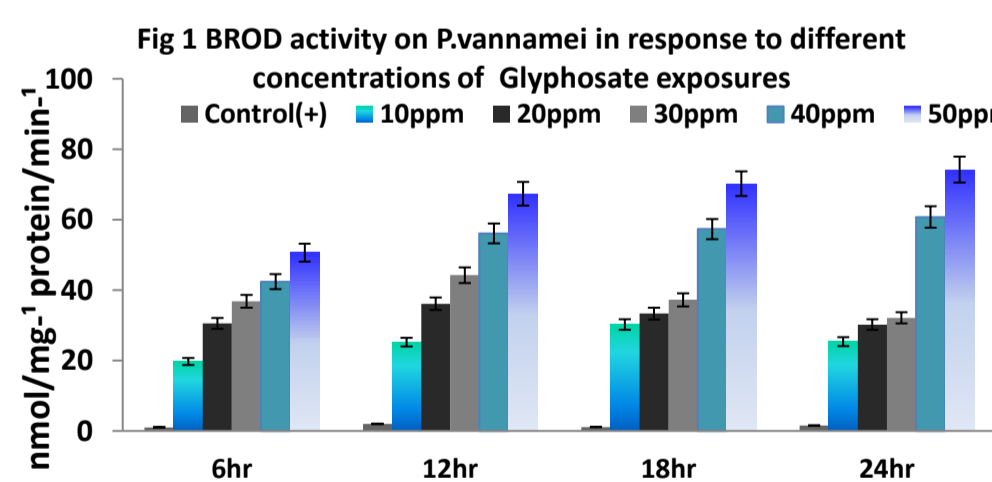
II. Methods

The undifferentiated post larval stages (PL) *P.vannamei* were collected from commercial field and their length is 1.760 ± 0.197cm and weight is 0.629 ± 0.081g ($P \leq 0.05$) used and 25 number in each tank. Five different concentrations of glyphosate corresponding to 10 to 50 ppm (part per million concentration) obtained by serial dilutions. Simultaneously, 1 positive and negative controls are respectively maintained at 24hr durations (all in triplicates). Furthermore, we investigated the effects of oxidative stress and biotransformation enzymes were analysed. The hepatopancreas were collected from *P. vannamei* at every six hour time interval. The inducibility and activity of phase I reaction of three CYP450 isoforms (7-benzoyloxyresorufin-O-dealkylase [BROD (CYP2B6)], 7-ethoxyresorufin-O-dealkylase [EROD (CYP1A1)] and methoxyresorufin-O-dealkylase [MROD (CYP1A2)] enzymes, Phase II reaction and antioxidant enzymes activities were measured in the hepatopancreas S9 fraction (fig-1) of *P.vannamei*. using multimode reader.

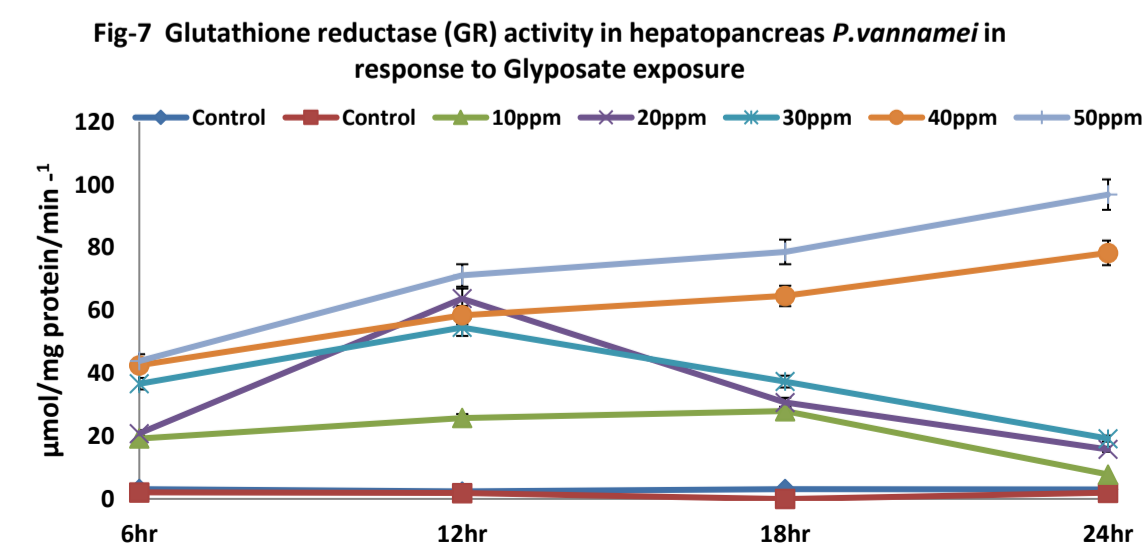
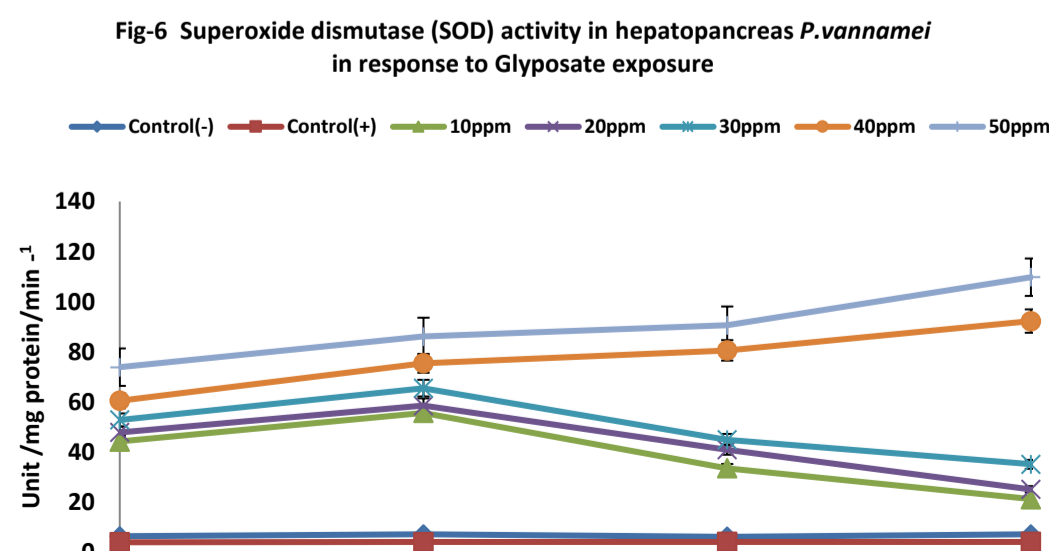
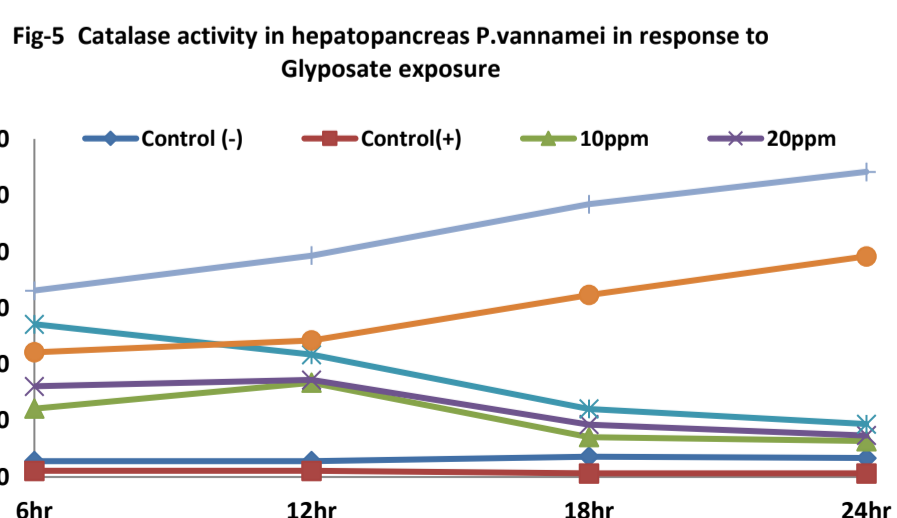


III. Results

Biotransformation-Phase I and Phase II Reaction



Oxidative Stress -Antioxidant enzymes reaction



IV Conclusion

- The present study noticed the enzymatic biotransformation is very essential to eliminate the toxic compound.
- The overall observation of the antioxidant enzymes result indicate the Glyphosate treatment all the enzymes were elevated at early stage then declined their activity in 10-30ppm while the other concentration such as 40-50ppm the enzymes activities were increased up to 24hr duration .
- The GSH, SOD, and CAT play a crucial role against ROS and neutralized it

V References

Amutha.C et al, 2009. Cytochrome P450-dependent mixed function oxidases (MFO) system dynamics during the Poly aromatic hydrocarbon (PAH) metabolism in green mussel *Perna viridis* (Linnaeus, 1758). *Environmental Bioindicators*. 4(1):97-116

VI Acknowledgment

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