

**LIST OF FIGURES**

<b>Figure No.</b>	<b>Content</b>	<b>Page No.</b>
1.	Catalase and SOD activity-in-gel-zymogram of mammalian in-vitro hepatic tissue (treated with chlorpyrifos/fenvalerate/nimbecidine) and insect in-vivo and in-vitro gut (treated with nimbecidine)	73
2.	DNA stability (%) of mammalian and bird in-vitro hepatic tissue (treated with chlorpyrifos/fenvalerate/nimbecidine) and insect in-vivo and in-vitro gut (treated with nimbecidine)	74
3.	Mitochondrial membrane potential/stability assays (Rhodamine method) by fluorescence microscopy	75
4.	Initial screening for experimental species of different agri-field species	78
5.	(a) Sex dependant percent mortality (%) after AZT treatment with different concentrations in <i>S. pr. prasiniferum</i> (b) Nutritional-indices after AZT treatment with different concentrations in <i>S. pr. prasiniferum</i> (c) Consumption index (CI) of some common acridids under semi-laboratory condition (d) Approximate digestibility (AD) of some selected acridids under semi-laboratory condition	93
6.	Total protein (a), MDA (b), NPSH (c), ALP (d) and AChE (e) content of in-vivo gut after 48-hrs AZT treatment with different concentrations in <i>S. pr. prasiniferum</i>	94

7.	Total protein (a), MDA (b), NPSH (c) and AChE (d) content of in-vitro gut after 6-hrs AZT treatment with different concentrations in <i>S. pr. prasiniferum</i>	95
8.	Effect of AZT on specific activity of marker enzymes of gut in <i>S. pr. prasiniferum</i> showing on a polyacrylamide gel (both in-vivo and in-vitro experiment)	96
9.	Effect of AZT on specific activity of digestive enzymes of gut in <i>S. pr. prasiniferum</i> on a polyacrylamide gel (both in-vivo and in-vitro experiment)	96
10.	Effect of AZT on gut DNA of <i>S. pr. prasiniferum</i>	97
11.	(a) and (b) <i>Spathosternum prasiniferum prasiniferum</i> (Walker 1871) (c) Sex ratios per generation of available acridid species from West Bengal, India (d) Reproduction rate of selected acridid species (e) Cumulative percent mortality (%) after AZT treatment (f) Nutritional-indices after AZT treatment	103
12.	Total protein (a), MDA (b), NPSH (c), ALP (d) and AChE (e) contents of in-vivo brain after AZT treatment with different concentrations in <i>S. pr. prasiniferum</i>	104
13.	Total protein (a), MDA (b), NPSH (c) and AChE (d) content of in-vitro brain after AZT treatment with different concentrations in <i>S. pr. prasiniferum</i>	105

14.	Total protein (a), MDA (b), NPSH (c), ALP (d) and AChE (e) content of haemolymph after AZT treatment with different concentrations in <i>S. pr. prasiniferum</i>	106
15.	Effect of AZT on specific activity of marker enzymes on brain and haemolymph of <i>S. pr. prasiniferum</i> showing on a polyacrylamide gel	107
16.	Effect of AZT on neural DNA of <i>S. pr. prasiniferum</i>	107
17.	(a) Egg pod laid by selected acridid species under semi-laboratory condition (b) Dose, time and sex dependent percent mortality (%) (c) Nymphal life span of selected acridid species (d) Adult life span of selected acridid species under semi-laboratory condition	109
18.	Total protein (a), MDA (b), NPSH (c), ALP (d) and AChE (e) content of in-vivo gonads after AZT treatment with different concentrations in <i>S. pr. prasiniferum</i>	110
19.	Total protein (a), MDA (b), NPSH (c) and AChE (d) content of in-vitro gonads after AZT treatment with different concentrations in <i>S. pr. prasiniferum</i>	111
20.	Effect of AZT on specific activity of marker enzymes of gonad in <i>S. pr. prasiniferum</i> showing on a polyacrylamide gel (both in-vivo and in-vitro experiment)	112
21.	Total protein (a), MDA (b), NPSH (c) and AChE (d) content of in-vitro juvenile tissue after AZT treatment with different concentrations in <i>S. pr. prasiniferum</i>	113

22. Effect of AZT on specific activity of marker enzymes of juvenile tissue in *S. pr. prasiniferum* showing on a polyacrylamide gel (in-vitro experiment) 114
23. Effect of AZT on gonadal DNA and juvenile tissue DNA of *S. pr. prasiniferum* 115

**LIST OF PLATES**

<b>Plate No.</b>	<b>Content</b>	<b>Page No.</b>
1.	Classification of pesticides	18
2.	The four-step univalent reduction of 'di-radical' oxygen	20
3.	Reactive oxygen species damage proteins, lipids and DNA	22
4.	Mitochondrial ROS production in cell	26
5.	Secondary metabolites of neem tree, <i>Azadirachta indica</i> A. Juss	30
6.	Mechanism of AZT toxicity in a living cell	35
7.	Acetylcholine, its regulation by AChE and inhibition of AChE activity by AZT	39
8.	Biological effects of AZT on insect	43
9.	Life cycle of <i>Spathosternum prasiniferum prasiniferum</i>	44
10.	Life table of Class-Insecta	46
11.	Structural formula of chlorpyrifos, fanvalarate (TATAfen) and nimbecidine (azadirachtin; AZT)	52
12.	Wild grasshopper collection for in-house rearing	55
13.	In-house rearing of grasshoppers	56
14.	In-house oviposition and random egg pods collection for produc- tion of mass hatchlings	57
15.	Initial screening of experimental species	58
16.	Identification report of experimental species from wild spe- cies by the Zoological Survey of India, Kolkata	59
17.	In-house rearing of <i>Spathosternum prasiniferum prasiniferum</i> (Walker 1871)	60

18.	Sex differentiation of <i>Spathosternum prasiniferum prasiniferum</i> (Walker 1871)	62
19.	Selection of pesticide used in toxicity studies	62
20.	Anatomical structure of a female insect	63
21.	In-house topical application of AZT	65
22.	Anatomical structure of a male insect	66
23.	Respective position and lineage diversification of four common living agri-field animals investigated in the screening toxicity study; cow, goat, bird-hen and an insect-grasshopper	76
24.	General morphology of <i>Spathosternum prasiniferum prasiniferum</i> (female and male)	79
25.	Deformity of <i>Spathosternum prasiniferum prasiniferum</i> after AZT toxicity	82
26.	Dissected organs after in-vivo and for in-vitro treatment	92
27.	Oxidative stress induced toxicity and DNA stability in some agri-field based live-stock/insect by widely used pesticides	118
28.	Free radicals (FRs) generation and reactive oxygen species (ROS) formations in biological system.	124
29.	Sex dimorphic adaptive responses against azadirachtin toxicity in gut tissues of <i>Spathosternum prasiniferum prasiniferum</i> (Orthoptera: Acridoidea)	133
30.	Neural oxidant-stress by AZT induces antioxidative enzymes evincing biomarker potential in paddy pest, <i>Spathosternum prasiniferum prasiniferum</i> (Orthoptera: Acridoidea)	136

31. Bio-indicator potential of *Spathosternum prasiniferum prasiniferum* (Orthoptera; Acridoidea) in pesticide (azadirachtin)-induced radical toxicity in gonadal/nymphal tissues; correlation with eco-sustainability 143
32. Diagram demonstrates the summary of the present study 144