List of Tables

Table 2.1 Sampling stations for cuttlefish collected onboard M.V. Sagarika and FORV Sagar Sampada

Table 2.2 Instrumental parameters and concentration range of metals used in the determination of various trace metals using Flame Atomic Absorption Spectrophotometer

Table 3.1 Distribution pattern of trace metals (Mean ± S.D and Range, ppm, wet wt) in the body components and whole soft parts of cuttlefish from Cochin region.

Table 3.2 Distribution pattern of trace metals (Mean ± S.D and Range, ppm, wet wt) in the body components and whole soft parts of cuttlefish from Quilon region.

Table 3.3 Distribution pattern of trace metals (Mean ± S.D and Range, ppm, wet wt) in the body components and whole soft parts of cuttlefish from Mangalore region.

Table 3.4 Distribution pattern of trace metals (Mean ± S.D and Range, ppm, wet wt) in the body components and whole soft parts of cuttlefish from Mumbai region.

Table 3.5 Environmental contaminants, tolerances, action levels and guidance levels as per FDA and EU regulations.

Table 3.6 Analysis of variance (ANOVA) of Cadmium in muscle of cuttlefish. (Regional variation)

Table 3.7 Analysis of variance (ANOVA) of Cadmium in liver of cuttlefish. (Regional variation)
Table 3.8  Analysis of variance (ANOVA) of Copper in muscle of cuttlefish.  
(Regional variation)

Table 3.9  Analysis of variance (ANOVA) of Copper in liver of cuttlefish.  
(Regional variation)

Table 3.10 Analysis of variance (ANOVA) of Zinc in muscle of cuttlefish.  
(Regional variation)

Table 3.11 Analysis of variance (ANOVA) of Zinc in liver of cuttlefish.  
(Regional variation)

Table 3.12 Analysis of variance (ANOVA) of Chromium in muscle of cuttlefish.  
(Regional variation)

Table 3.13 Analysis of variance (ANOVA) of Chromium in liver of cuttlefish.  
(Regional variation)

Table 4.1a Distribution pattern of trace metals (Mean ± S.D and Range, ppm, wet wt)  
in the body components of cuttlefish during premonsoon season  
(Cochin region).

Table 4.1b Distribution pattern of trace metals (Mean ± S.D and Range, ppm, wet wt)  
in the body components of cuttlefish during monsoon season  
(Cochin region).

Table 4.1c Distribution pattern of trace metals (Mean ± S.D and Range, ppm, wet wt)  
in the body components of cuttlefish during postmonsoon season  
(Cochin region).

Table 4.2a Distribution pattern of trace metals (Mean ± S.D and Range, ppm, wet wt)  
in the body components of cuttlefish during premonsoon season  
(Quilon region).
Table 4.2b  Distribution pattern of trace metals (Mean ± S.D and Range, ppm, wet wt) in the body components of cuttlefish during monsoon season (Quilon region).

Table 4.2c  Distribution pattern of trace metals (Mean ± S.D and Range, ppm, wet wt) in the body components of cuttlefish during postmonsoon season (Quilon region).

Table 4.3a  Distribution pattern of trace metals (Mean ± S.D and Range, ppm, wet wt) in the body components of cuttlefish during premonsoon season (Mangalore region).

Table 4.3b  Distribution pattern of trace metals (Mean ± S.D and Range, ppm, wet wt) in the body components of cuttlefish during monsoon season (Mangalore region).

Table 4.3c  Distribution pattern of trace metals (Mean ± S.D and Range, ppm, wet wt) in the body components of cuttlefish during postmonsoon season (Mangalore region).

Table 4.2  Analysis of variance (ANOVA) of Cadmium in muscle of cuttlefish. (Seasonal variation)

Table 4.3  Analysis of variance (ANOVA) of Cadmium in liver of cuttlefish. (Seasonal variation)

Table 4.4  Analysis of variance (ANOVA) of Copper in muscle of cuttlefish. (Seasonal variation)

Table 4.5  Analysis of variance (ANOVA) of Copper in liver of cuttlefish. (Seasonal variation)

Table 4.6  Analysis of variance (ANOVA) of Zinc in muscle of cuttlefish. (Seasonal variation)
Table 4.7  Analysis of variance (ANOVA) of Zinc in liver of cuttlefish.  
(Seasonal variation)

Table 4.8  Analysis of variance (ANOVA) of Chromium in muscle of cuttlefish.  
(Seasonal variation)

Table 4.9  Analysis of variance (ANOVA) of Chromium in liver of cuttlefish.  
(Seasonal variation)

Table 5.1  Fishes/shellfish found in the mantle cavity of cuttlefish  

Table 5.2  Trace metal concentrations (Mean ± S.D and Range, ppm, wet weight) in the body components of cuttlefish caught onboard MV Sagarika and FORV Sagar Sampada at 30-70m depth, off west coast of India.

Table 5.3  Distribution pattern of heavy metals (Mean ± S.D and Range, ppm, wet wt) in fishes separated from the mantle cavity of cuttlefish collected off Cochin.

Table 5.4  Distribution pattern of heavy metals (Mean ± S.D and Range, ppm, wet wt) in fishes caught in the same trawl net during May – June 1998 onboard the fishing vessel MV Sagarika from the west coast of India.

Table 5.5  Trace metal concentrations in water samples collected onboard MV Sagarika at 30-58 m depth (Range expressed in µg/L)

Table 5.6  Trace metal concentrations in water samples collected onboard FORV Sagar Sampada at 200-350m depth (Range expressed in µg/L)

Table 6.1  Proximate and nutrient composition of diet for experimental albino rats.

Table 6.2  Body weight of control and experimental albino rats fed with Cd incorporated diet (expressed in g)

Table 6.3  pH of the urine of control and experimental albino rats fed with Cd incorporated diet.
Table 6.4  Concentration of nutrient elements in the urine of albino rats fed with Cd incorporated diet (expressed in μg/day)

Table 6.5  Concentration of trace metals in the body components of control and experimental albino rats fed with Cd incorporated diets (Mean ± S.D and Range, ppm, wet wt)

Table 6.6  Haematological analysis of experimental albino rats fed with diets containing cuttlefish liver with bound cadmium at 40 ppm and inorganic cadmium as CdCl₂ (40 ppm).
List of Figures

Fig 2.1 Sampling stations for cuttlefish collected onboard FORV Sagar Sampada (Cruise No. 191).

Fig 3.1 Heavy metal concentrations (Mean, ppm, wet wt) in the body components and whole soft parts of cuttlefish from Cochin region.

Fig 3.2 Heavy metal concentrations (Mean, ppm, wet wt) in the body components and whole soft parts of cuttlefish from Quilon region.

Fig 3.3 Heavy metal concentrations (Mean, ppm, wet wt) in the body components and whole soft parts of cuttlefish from Mangalore region.

Fig 3.4 Heavy metal concentrations (Mean, ppm, wet wt) in the body components and whole soft parts of cuttlefish from Mumbai region.

Fig 4.1a Seasonal variation of heavy metals (Mean, ppm, wet wt) in the body components of cuttlefish from Cochin region during premonsoon season.

Fig 4.1b Seasonal variation of heavy metals (Mean, ppm, wet wt) in the body components of cuttlefish from Cochin region during monsoon season.

Fig 4.1c Seasonal variation of heavy metals (Mean, ppm, wet wt) in the body components of cuttlefish from Cochin region during postmonsoon season.

Fig 4.2a Seasonal variation of heavy metals (Mean, ppm, wet wt) in the body components of cuttlefish from Quilon during premonsoon season.

Fig 4.2b Seasonal variation of heavy metals (Mean, ppm, wet wt) in the body components of cuttlefish from Quilon region during monsoon season.

Fig 4.2c Seasonal variation of heavy metals (Mean, ppm, wet wt) in the body components of cuttlefish from Quilon region during postmonsoon season.
Fig 4.3a  Seasonal variation of heavy metals (Mean, ppm, wet wt) in the body components of cuttlefish from Mangalore region during premonsoon season.

Fig 4.3b  Seasonal variation of heavy metals (Mean, ppm, wet wt) in the body components of cuttlefish from Mangalore region during monsoon season.

Fig 4.3c  Seasonal variation of heavy metals (Mean, ppm, wet wt) in the body components of cuttlefish from Mangalore region during postmonsoon season.

Fig 5.1a  Regression plot of metal levels in fishes separated from the mantle cavity of cuttlefish vs. metal levels in food fishes (expressed in ppm).

Fig 5.1b  Regression plot of metal levels in fishes separated from the mantle cavity of cuttlefish vs. metal levels in food fishes (expressed in ppm).

Fig 5.1c  Regression plot of metal levels in fishes separated from the mantle cavity of cuttlefish vs. metal levels in food fishes (expressed in ppm).

Fig 5.2a  Regression plot of metal levels in fishes caught in the same habitat area of cuttlefish vs. metal levels in food fishes (expressed in ppm).

Fig 5.2b  Regression plot of metal levels in fishes separated from the mantle cavity of cuttlefish vs. metal levels in food fishes (expressed in ppm).
## List of Plates

<table>
<thead>
<tr>
<th>Plate 6.1</th>
<th>Microphotograph of kidney tissue of control albino rats (H.E. x 20)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plate 6.2</td>
<td>Microphotograph of liver hepatocytes of control albino rats (H.E. x 20)</td>
</tr>
<tr>
<td>Plate 6.3</td>
<td>Microphotograph of kidney tissue of experimental albino rats fed with diet containing Cd at 40 ppm level showing shrinkage of glomeruli (H.E. x 20)</td>
</tr>
<tr>
<td>Plate 6.4</td>
<td>Microphotograph of liver tissue of experimental albino rats fed with diet containing Cd at 40 ppm level showing pyknotic nuclei and mild bilary epithelial proliferation (H.E. x 20)</td>
</tr>
</tbody>
</table>