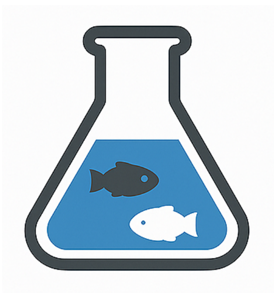
LC_{50}/EC_{50} Calculator

User Manual

Version 1.0.0



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1. Introduction

1.1 About the Program

The LC_{50}/EC_{50} Calculator is an advanced professional software designed for precise calculation of lethal concentration (LC_{50}) and effective concentration (EC_{50}) of chemical substances on test organisms. The program is developed in the Rust programming language with the Tauri framework, ensuring high performance and security.

1.1.1 Key Features

- **Four statistical methods**: Probit, Logit, Weibull, and Spearman-Kärber
- **Automatic calculation of additional parameters**: EC_{10}, EC_{90}, LOEC, NOEC, MATC
- **Benchmark doses (BMD)**: BMC_{10} and BMC_{20} with 95% confidence intervals
- **Risk assessment**: PNEC calculations for different ecosystems
- **Data visualization**: Interactive graphs with regression curves
- **PDF reports**: Automatic generation of professional reports
- **CSV log**: Permanent storage of all analyses
- **Settings memory**: Automatic saving of user preferences

1.2 System Requirements

Table 1.1: Minimum system requirements

Component	**Requirement**
Operating System	Windows 10/11, macOS 10.15+, Ubuntu 20.04+
RAM	Minimum 4 GB (recommended 8 GB)
Disk Space	200 MB for installation
Screen Resolution	Minimum 1280×720 (recommended 1920×1080)
.NET Framework	Version 4.7.2 or newer (Windows only)

2. Installation

2.1 Windows Installation

2.1.1 Download

1. Go to `https://sciom.hr/lc50-calculator/download`
2. Download `LC50Calculator-Setup.exe`
3. Verify SHA-256 checksum for security

2.1.2 Installation Procedure

1. Run `LC50Calculator-Setup.exe` as administrator
2. Accept license terms
3. Select installation directory (recommended: `C:\Program Files\LC50Calculator`)
4. Select components:
   - ✓ Main program
   - ✓ Desktop shortcut
   - ✓ Start menu shortcuts
   - ✓ Context menu for CSV files
5. Click "Install"
6. Wait for installation to complete
7. Click "Finish" to launch the program

Windows Defender Warning

During first installation, Windows Defender may display a warning. Click "More info" then "Run anyway" as the software is safe and digitally signed.

2.2 Ubuntu/Linux Installation

2.2.1 AppImage Method (Recommended)

```
# Download AppImage
wget https://sciom.hr/downloads/LC50Calculator
    -1.0.0.AppImage

# Make it executable
chmod +x LC50Calculator-1.0.0.AppImage

# Run
./LC50Calculator-1.0.0.AppImage
```

Listing 2.1: AppImage installation

2.2.2 DEB Package for Debian/Ubuntu

```
# Download DEB package
wget https://sciom.hr/downloads/lc50calculator_1
    .0.0_amd64.deb

# Install dependencies
sudo apt update
sudo apt install libgtk-3-0 libwebkit2gtk-4.0-37

# Install package
sudo dpkg -i lc50calculator_1.0.0_amd64.deb

# Fix any dependency issues
sudo apt --fix-broken install
```

Listing 2.2: DEB installation

2.2.3 Snap Package

```
sudo snap install lc50calculator
```

Listing 2.3: Snap installation

2.3 macOS Installation

2.3.1 DMG Installation

1. Download `LC50Calculator-1.0.0.dmg`
2. Double-click the DMG file
3. Drag the application icon to the Applications folder
4. Eject DMG
5. Launch from Applications

2.3.2 Homebrew Installation

```
# Add SCIOM tap
brew tap sciom/tools

# Install
brew install --cask lc50calculator
```

Listing 2.4: Homebrew installation

macOS Gatekeeper

On first launch, macOS may block the application. Go to System Preferences → Security & Privacy and click "Open Anyway".

3. Theoretical Foundations

3.1 LC_{50} and EC_{50} Concept

LC_{50} (Lethal Concentration 50) represents the concentration of a test substance that causes death in 50% of exposed organisms during a specified time period.

EC_{50} (Effective Concentration 50) denotes the concentration that causes a specific effect (e.g., growth inhibition, immobilization) in 50% of test organisms.

3.2 Mathematical Foundations

3.2.1 Probit Analysis

Probit transformation is based on the assumption of normal distribution of tolerance:

$$\text{Probit}(p) = \Phi^{-1}(p) + 5 \tag{3.1}$$

where Φ^{-1} is the inverse function of the standard normal distribution, and p is the mortality proportion.

Abbott's Correction

For boundary values, Abbott's correction is applied:

$$p_{\text{corr}} = \frac{0.5}{n} \quad \text{for } p = 0 \tag{3.2}$$

$$p_{\text{corr}} = \frac{n - 0.5}{n} \quad \text{for } p = 1 \tag{3.3}$$

Linear Regression

After transformation, linear regression is applied:

$$Y = a + b \cdot \ln(X) \tag{3.4}$$

where:

- Y - probit value
- X - concentration
- a - intercept
- b - slope

LC_{50} is calculated as:

$$\ln(\text{LC}_{50}) = \frac{5 - a}{b} \tag{3.5}$$

3.2.2 Logit Analysis

Logit transformation uses the logistic function:

$$\text{Logit}(p) = \ln\left(\frac{p}{1-p}\right) \tag{3.6}$$

For LC_{50}:

$$\ln(\text{LC}_{50}) = \frac{0-a}{b} \tag{3.7}$$

3.2.3 Weibull Analysis

Weibull transformation:

$$W(p) = \ln(-\ln(1-p)) \tag{3.8}$$

LC_{50} is calculated as:

$$\ln(\text{LC}_{50}) = -\frac{a}{b} \tag{3.9}$$

3.2.4 Spearman-Kärber Method

A non-parametric method that requires no distribution assumptions:

$$\log \text{LC}_{50} = \log x_0 + h\left(\sum_{i=1}^{n} p_i - 0.5\right) \tag{3.10}$$

where:

- x_0 - lowest dose
- h - logarithmic interval between doses
- p_i - mortality proportions

Standard error:

$$SE = h\sqrt{\sum_{i=1}^{n} \frac{p_i(1-p_i)}{n_i}} \tag{3.11}$$

95% confidence interval:

$$\text{CI}_{95\%} = \text{LC}_{50} \times e^{\pm 1.96 \cdot SE} \tag{3.12}$$

3.3 Additional Parameters

3.3.1 EC_{10} and EC_{90}

For the Probit method:

$$\text{EC}_{10} = \exp\left(\frac{\Phi^{-1}(0.1) + 5 - a}{b}\right) \tag{3.13}$$

$$\text{EC}_{90} = \exp\left(\frac{\Phi^{-1}(0.9) + 5 - a}{b}\right) \tag{3.14}$$

3.3.2 NOEC and LOEC

NOEC (No Observed Effect Concentration) - the highest concentration with no observed effect.

LOEC (Lowest Observed Effect Concentration) - the lowest concentration with an observed effect.

The program automatically determines NOEC and LOEC based on statistical analysis (threshold: 10% increase in mortality).

3.3.3 MATC

Maximum Acceptable Toxicant Concentration:

$$\mathrm{MATC} = \sqrt{\mathrm{NOEC} \times \mathrm{LOEC}} \tag{3.15}$$

3.3.4 Benchmark Doses (BMD)

BMC_{10} and BMC_{20} are calculated using the bootstrap method (1000 iterations):

$$\mathrm{BMC}_x = \exp\left(\frac{\mathrm{target}_x - a}{b}\right) \tag{3.16}$$

where target_x is the transformed value for x% response.

3.3.5 PNEC Values

Predicted No Effect Concentration according to REACH guidelines:

Table 3.1: PNEC assessment factors

Ecosystem	**AF**	**Formula**
Aquatic	1000	POD/1000
Terrestrial	1000	POD/1000
Sediment	10	POD/10

where POD (Point of Departure) is determined hierarchically:

1. NOEC (if available)
2. BMC_{10} lower bound
3. LOEC/3

4. Using the Program

4.1 Launching the Program

4.1.1 Windows

- Double-click the desktop icon
- Or: Start menu → LC50 Calculator
- Or: Right-click on CSV file → Open with → LC50 Calculator

4.1.2 Linux

```
# From terminal
lc50calculator

# Or from application menu
# Applications -> Science -> LC50 Calculator
```

4.1.3 macOS

- Launchpad → LC50 Calculator
- Or: Applications → LC50 Calculator
- Or: Spotlight search (Cmd+Space) → "LC50"

4.2 Program Interface

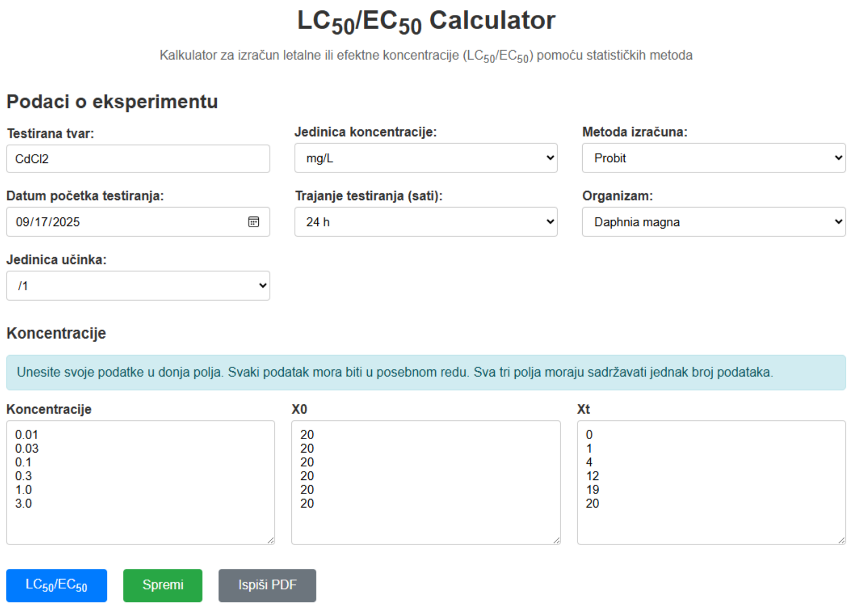

Figure 4.1: Main program interface

4.2.1 Interface Areas

1. **Experiment data** - basic test information
2. **Data input** - concentrations and results
3. **Control buttons** - calculate, save, PDF
4. **Results** - displayed after calculation
5. **Graph** - visualization of regression analysis

4.3 Data Entry

4.3.1 Basic Data

Table 4.1: Basic data fields

Field	Description
Test Substance	Name or chemical formula (e.g., "$CdCl_2$")
Concentration Unit	mg/L, µg/L, g/L or custom
Calculation Method	Probit, Logit, Weibull or Spearman-Kärber
Start Date	Date when experiment started
Test Duration	24h, 48h, 72h, 96h or custom
Organism	Select from list or enter custom
Effect Unit	/1, /mm^2, /FU or custom

4.3.2 Experimental Data

Data is entered in three columns, each data point on a new row:

Input Format

Concentrations	X_0	X_t
0.1	20	0
0.5	20	2
1.0	20	5
5.0	20	15
10.0	20	20

4.3.3 Calculation Results

Figure 4.2: Calculation results

5. Usage Examples

5.1 Example 1: Acute Toxicity to *Daphnia magna*

5.1.1 Scenario

Testing the toxicity of copper sulfate ($CuSO_4$) on water fleas according to OECD 202 protocol.

5.1.2 Experimental Design

- **Test organism**: *Daphnia magna* ($<$ 24h old)
- **Duration**: 48 hours
- **Temperature**: 20 ± 1°C
- **pH**: 7.8 ± 0.2
- **Dissolved oxygen**: $>$ 6 mg/L
- **Photoperiod**: 16h light : 8h dark

5.1.3 Input Procedure

1. **Basic data**:
   - Test substance: `CuSO4`
   - Unit: `mg/L`
   - Method: `Probit`
   - Date: `2025-01-15`
   - Duration: `48 h`
   - Organism: `Daphnia magna`
   - Effect unit: `/1`
2. **Experimental data**:

Table 5.1: Data for *Daphnia magna* test

Concentration (mg/L)	X_0	X_t
0.01	20	0
0.03	20	1
0.1	20	4
0.3	20	12
1.0	20	19
3.0	20	20

3. Click **Calculate LC_{50}/EC_{50}**

5.1.4 Expected Results

Table 5.2: Analysis results for $CuSO_4$

Parameter	Value
LC_{50}	0.217 ± 0.034 mg/L
EC_{10}	0.089 mg/L
EC_{90}	0.531 mg/L
NOEC	0.03 mg/L
LOEC	0.1 mg/L
R^2	0.982
Slope	2.847

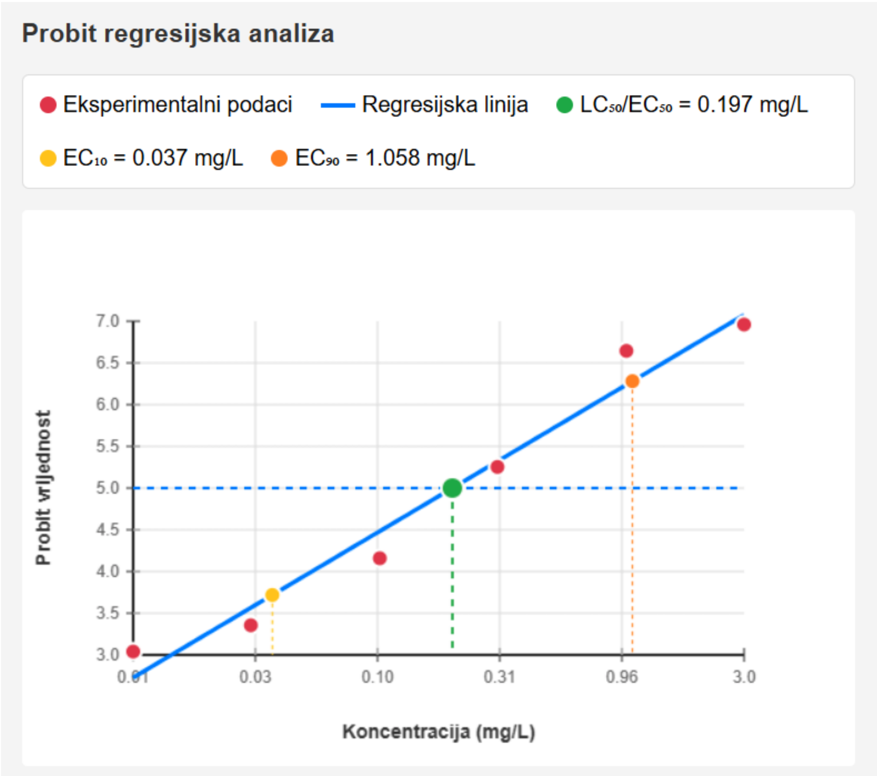

Figure 5.1: Probit analysis for $CuSO_4$ on *Daphnia magna*

5.1.5 Interpretation

- $LC_{50} = 0.217$ mg/L classifies $CuSO_4$ as **very toxic** to aquatic organisms
- $R^2 = 0.982$ shows excellent model fit
- EC_{90}/EC_{10} ratio = 5.96 indicates a moderately steep dose-response curve
- $PNEC_{aquatic} = 0.000217$ mg/L (applying factor of 1000)

5.2 Example 2: Algal Growth Inhibition

5.2.1 Scenario

Growth inhibition test on *Pseudokirchneriella subcapitata* with the herbicide atrazine according to OECD 201.

5.2.2 Procedure

1. **Basic data**:
   - Test substance: `Atrazine`
   - Unit: `µg/L`
   - Method: `Weibull` (better for growth curves)
   - Duration: `72 h`
   - Organism: `Pseudokirchneriella subcapitata`
   - Effect unit: `/FU` (fluorescence units)
2. **Data**:

Table 5.3: Data for algal growth inhibition test

Concentration (µg/L)	Control FU	Inhibited FU
0	1000	0
10	1000	50
30	1000	180
100	1000	420
300	1000	750
1000	1000	950

5.2.3 Results

- EC_{50} = 112.4 µg/L
- EC_{10} = 28.7 µg/L
- BMC_{10} = 31.2 µg/L (95% CI: 24.8-38.9)
- $PNEC_{aquatic}$ = 0.112 µg/L

5.3 Example 3: Spearman-Kärber for Terrestrial Organisms

5.3.1 Scenario

Contact toxicity test of pesticide on earthworms *Eisenia fetida*.

5.3.2 Spearman-Kärber Method Specifics

- Requires geometric progression of concentrations
- Does not require normal distribution
- Ideal for data with 0% and 100% mortality

5.3.3 Data

Table 5.4: Geometric progression for Spearman-Kärber

Concentration (mg/kg)	N	Mortality
1	10	0
3	10	1
9	10	3
27	10	6
81	10	9
243	10	10

Note: Factor between concentrations = 3 (geometric progression)

5.3.4 Results

- LC_{50} = 34.7 mg/kg
- 95% CI: 22.1 - 54.5 mg/kg
- Method does not provide R^2 value (non-parametric)

6. Advanced Features

6.1 Automatic Settings Memory

The program automatically saves last used settings in:

Table 6.1: Settings locations

OS	Path
Windows	C:\Users\[USERNAME]\AppData\Roaming\LC50Calculator\settings.json
macOS	~/Library/Application Support/LC50Calculator/settings.json
Linux	~/.config/LC50Calculator/settings.json

6.1.1 Structure of settings.json

```json
{
        "test_substance": "CuSO4",
        "unit": "mg/L",
        "method": "Probit",
        "organism": "Daphnia magna",
        "test_duration": "48 h",
        "concentrations": "0.01\n0.03\n0.1\n0.3\n1.0",
        "total_organisms": "20\n20\n20\n20\n20",
        "dead_organisms": "0\n1\n4\n12\n19"
}
```

Listing 6.1: Example settings.json file

6.2 CSV Log File

Each save adds a record to `log.csv`:

```
Timestamp,Test Substance,Organism,Test Date,Test Duration,
Method,Concentration Unit,Effect Unit,LC50/EC50,EC10,EC90,
LOEC,NOEC,MATC,Slope,Intercept,R-squared,BMC10,BMCL10,
BMCU10,BMC20,BMCL20,BMCU20,POD,PNEC Aquatic,
PNEC Terrestrial,PNEC Sediment
```

Listing 6.2: Structure of log.csv file

6.2.1 Data Import/Export

Importing CSV Data

The program can load existing CSV files with data. The format must be:

- First column: concentrations
- Second column: total number of organisms
- Third column: number of dead/affected organisms
- Separator: comma (,) or semicolon (;)

6.3 PDF Reports

Automatically generated PDFs contain:

1. **Title page**
   - Substance and organism name
   - Test date and duration
   - Institutional data
2. **Analysis results**
   - All calculated values
   - Statistical parameters
   - Confidence intervals
3. **Graphical display**
   - Regression curve
   - Experimental data
   - LC/EC values
4. **Data table**
   - Concentrations
   - Number of organisms
   - Mortality percentage
5. **Interpretation**
   - Model quality assessment
   - Regulatory suitability
   - Recommendations

7. Troubleshooting

7.1 Common Errors

Table 7.1: Common errors and solutions

Error	Solution
"All arrays must have the same length"	Check that all columns have the same number of rows
"All concentrations must be positive"	Remove zero or negative values
"Insufficient data for regression"	Enter at least 2 rows of data
"Spearman-Kärber requires geometric progression"	Use concentrations in constant ratio (e.g., 1, 2, 4, 8...)
"$R^2 < 0.7$"	Model fits poorly, try another method
"PDF generation failed"	Check write permissions and disk space

7.2 Recommended Practices

7.2.1 Data Preparation

1. **Number of concentrations**: Minimum 5 + control
2. **Range**: Cover 0-100% mortality
3. **Spacing**: Geometric progression (factor 2-3)
4. **Replicates**: At least 3 per concentration
5. **Control**: Mortality < 10%

7.2.2 Method Selection

Table 7.2: Method selection guide

Method	When to Use
Probit	First choice, normal distribution, standard in ecotoxicology
Logit	Alternative to Probit, often gives similar results
Weibull	Asymmetric data, growth curves, hormesis effects
Spearman-Kärber	Non-parametric alternative, geometric progression

7.2.3 Results Validation

Acceptability Criteria

- $R^2 > 0.9$ for regulatory purposes
- $R^2 > 0.8$ for research purposes
- Control mortality $< 10\%$
- CV between replicates $< 30\%$
- LC_{50} within range of tested concentrations

7.3 FAQ

Q: Can I use the program for plants?
A: Yes, use EC_{50} for growth or germination inhibition.
Q: What if I don't have 100% mortality?
A: The program automatically applies Abbott's correction.
Q: How do I export results for publication?
A: Use the PDF report or copy from the CSV log file.
Q: Does the program support IC_{50}?
A: Yes, IC_{50} is equivalent to EC_{50} for inhibition.

8. Technical Specifications

8.1 Program Architecture

The program is built with modern technologies:

Table 8.1: Technology stack

Component	Technology
Backend	Rust 1.75+
Frontend	HTML5, CSS3, JavaScript (ES6+)
Framework	Tauri 1.6
PDF generation	pdf-writer 0.10
Statistics	statrs 0.16
UI rendering	WebView2 (Windows), WebKit (macOS/Linux)

8.2 API Documentation

8.2.1 Rust Functions

```rust
#[tauri::command]
fn calculate_lc50(data: ExperimentData)
-> Result<ProbitResult, String>

#[tauri::command]
fn calculate_logit(data: ExperimentData)
-> Result<LogitResult, String>

#[tauri::command]
fn calculate_weibull(data: ExperimentData)
-> Result<WeibullResult, String>

#[tauri::command]
fn calculate_spearman_karber(data: ExperimentData
)
-> Result<SpearmanKarberResult, String>

#[tauri::command]
fn generate_pdf(pdf_data: PdfData)
-> Result<String, String>

#[tauri::command]
fn save_log_csv(csv_content: String)
-> Result<String, String>
```

Listing 8.1: Main Rust functions

8.2.2 JavaScript Functions

```
async function calculateLC50() {
        const data = collectData();
        const result = await invoke('
           calculate_lc50', { data });
        displayResults(result);
}

function collectData() {
        return {
                concentrations: [...],
                total_organisms: [...],
                dead_organisms: [...]
        };
}

function drawChart(results) {
        // Canvas rendering logic
}

async function generatePDF() {
        const chartPng = getChartAsBase64();
        await invoke('generate_pdf', { ...data,
           chartPng });
}
```

Listing 8.2: Frontend functions

8.3 Data Structures

```
#[derive(Debug, Serialize, Deserialize)]
pub struct ExperimentData {
        pub concentrations: Vec<f64>,
        pub total_organisms: Vec<usize>,
        pub dead_organisms: Vec<usize>,
}

#[derive(Debug, Serialize)]
pub struct ProbitResult {
        pub lc50: f64,
        pub slope: f64,
        pub intercept: f64,
        pub r_squared: f64,
        pub probit_data: Vec<ProbitPoint>,
        pub regression_line: Vec<(f64, f64)>,
        pub additional_values: AdditionalValues,
}

#[derive(Debug, Serialize)]
```

```
                pub struct AdditionalValues {
                        pub ec10: f64,
                        pub ec90: f64,
                        pub loec: Option<f64>,
                        pub noec: Option<f64>,
                        pub benchmark_doses: BenchmarkDose,
                        pub risk_assessment: RiskAssessment,
                        pub matc: Option<f64>,
                }
```

Listing 8.3: Basic structures

9. References and Standards

9.1 International Standards

- **OECD Guidelines**:
  - OECD 201: Alga Growth Inhibition Test
  - OECD 202: Daphnia sp. Acute Immobilisation Test
  - OECD 203: Fish, Acute Toxicity Test
  - OECD 207: Earthworm, Acute Toxicity Tests
  - OECD 211: Daphnia magna Reproduction Test
- **ISO Standards**:
  - ISO 14442:2006 - Water quality guidelines
  - ISO 11348 - Vibrio fischeri bioluminescence
  - ISO 10706 - Chronic toxicity to Daphnia magna
- **EU Regulations**:
  - REACH Regulation (EC) No 1907/2006
  - CLP Regulation (EC) No 1272/2008
  - Water Framework Directive 2000/60/EC
- **US EPA**:
  - ECOTOX Database Standard Operating Procedures
  - Series 850 - Ecological Effects Test Guidelines

9.2 Literature

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3. OECD (2006). Current Approaches in the Statistical Analysis of Ecotoxicity Data: A Guidance to Application. Series on Testing and Assessment No. 54.
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5. Wheeler, J.R., Grist, E.P.M., Leung, K.M.Y., Morritt, D., Crane, M. (2002). Species sensitivity distributions: data and model choice. *Marine Pollution Bulletin*, 45, 192-202.

6. Ritz, C., Baty, F., Streibig, J.C., Gerhard, D. (2015). Dose-Response Analysis Using R. *PLOS ONE*, 10(12), e0146021.

7. EFSA (2013). Guidance on tiered risk assessment for plant protection products for aquatic organisms in edge-of-field surface waters. *EFSA Journal*, 11(7), 3290.

9.3 Web Resources

- SCIOM website: `https://sciom.hr`
- Program download: `https://lcec50calculator.sciom.hr`
- GitHub repository: `https://github.com/Branimir-K-Hackenberger/lcec50-calculator`
- OECD Test Guidelines: `https://www.oecd.org/chemicalsafety/testing/`
- US EPA ECOTOX: `https://cfpub.epa.gov/ecotox/`
- REACH helpdesk: `https://echa.europa.eu/support`

A. List of Organisms

A.1 Aquatic Organisms

Table A.1: Standard aquatic test organisms

Species	Group	Application
Daphnia magna	Crustacea	Acute and chronic toxicity, standard
Ceriodaphnia dubia	Crustacea	Chronic toxicity, more sensitive
Danio rerio	Pisces	Acute toxicity, embryotoxicity
Oryzias latipes	Pisces	Endocrine disruptors
Pimephales promelas	Pisces	US EPA standard
Pseudokirchneriella subcapitata	Algae	Growth inhibition, primary producers
Desmodesmus subspicatus	Algae	EU alternative
Chlorella vulgaris	Algae	Freshwater alga
Lemna minor	Macrophyta	Aquatic plants
Myriophyllum spicatum	Macrophyta	Submerged macrophyte
Vibrio fischeri	Bacteria	Bioluminescence, rapid test
Tetrahymena pyriformis	Protozoa	Single-celled eukaryotes
Chironomus riparius	Insecta	Sediment toxicity
Gammarus pulex	Crustacea	Running waters
Hyalella azteca	Crustacea	Sediment, North America

A.2 Terrestrial Organisms

Table A.2: Standard terrestrial test organisms

Species	Group	Application
Eisenia fetida	Oligochaeta	Acute and chronic, OECD standard
Eisenia andrei	Oligochaeta	Alternative to E. fetida
Enchytraeus crypticus	Enchytraeidae	Reproduction, more sensitive
Folsomia candida	Collembola	Soil arthropods
Lactuca sativa	Dicotyledonae	Germination, root growth
Avena sativa	Monocotyledonae	Monocotyledons
Brassica napus	Dicotyledonae	Oilseed rape
Apis mellifera	Hymenoptera	Bees, pollinators
Bombus terrestris	Hymenoptera	Bumblebees

Species	Group	Application
Aleochara bilineata	Coleoptera	Beneficial insects
Pardosa sp.	Araneae	Spiders, predators
Porcellio scaber	Isopoda	Decomposers
Lumbricus terrestris	Oligochaeta	Deep-burrowing earthworms

B. Formulas and Constants

B.1 Transformation Functions

Table B.1: Transformation functions for different methods

Method	Transformation
Probit	$Y = \Phi^{-1}(p) + 5$
Logit	$Y = \ln\left(\frac{p}{1-p}\right)$
Weibull	$Y = \ln(-\ln(1-p))$
Gompertz	$Y = -\ln(-\ln(p))$
Angular	$Y = \arcsin(\sqrt{p})$

B.2 Statistical Constants

Table B.2: Critical values for different significance levels

Parameter	90% CI	95% CI	99% CI
z-value	1.645	1.960	2.576
t (df=10)	1.812	2.228	3.169
t (df=20)	1.725	2.086	2.845
t (df=30)	1.697	2.042	2.750

B.3 Assessment Factors

Table B.3: REACH assessment factors (AF)

Available Data	AF
Acute $L(E)C_{50}$ for 3 trophic levels	1000
Lowest chronic NOEC for 1 species	100
Chronic NOEC for 2 trophic levels	50
Chronic NOEC for 3 trophic levels	10
SSD (5% HC_5)	1-5
Field data	1-5

C. Contact and Support

C.1 Technical Support

Contact	Details
Email	support@sciom.hr
Phone	+385 31 123 456
Web	https://sciom.hr/support
Working hours	Mon-Fri, 8:00-16:00 CET

C.2 Bug Reporting

To report issues, please include:

1. Program version (Help → About)
2. Operating system
3. Problem description
4. Steps to reproduce
5. Screenshot of error
6. CSV file with data

Email: `bugs@sciom.hr`

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