Dose-response modelling using R

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Package overview: `drc`

Principal idea: **use of self starter functions**

Model fitting function: **`drm()`**

- ***Feel*** and interface much like `lm()` and `glm()`
- Response: continuous, count, or quantal
- One or more curves separately/simultaneously
- Parameter constraints possible

Methods: `anova`, `plot`, `predict`, `summary` ...

Applications

Some examples:

- **Hearing and speech science**
  - Estimation of psychometric functions
- **Screening of drugs**
  - Analysis of high-throughput dose-response data
- **Toxicity tests**
  - Estimation of effect concentrations (e.g. EC/ED/LC/LD50)
- **Weed science**
  - Modelling seed germination, yield loss

Elaborate infrastructure

Off-the-shelf model functions:

- *Symmetric:* log-logistic, log-normal (*Hill*)
- *Asymmetric: Richards*, *Weibull* models (2 types) (*also Gompertz*)
- *Other:* binary mixtures, fractional polynomials, hormesis models (*e.g. Brain-Cousens*)

Full flexibility in model specification:

- Special cases obtained by fixing parameter values
- *Examples:* asymptotic regression, exponential decay, logit, Michaelis-Menten, probit

Special functions

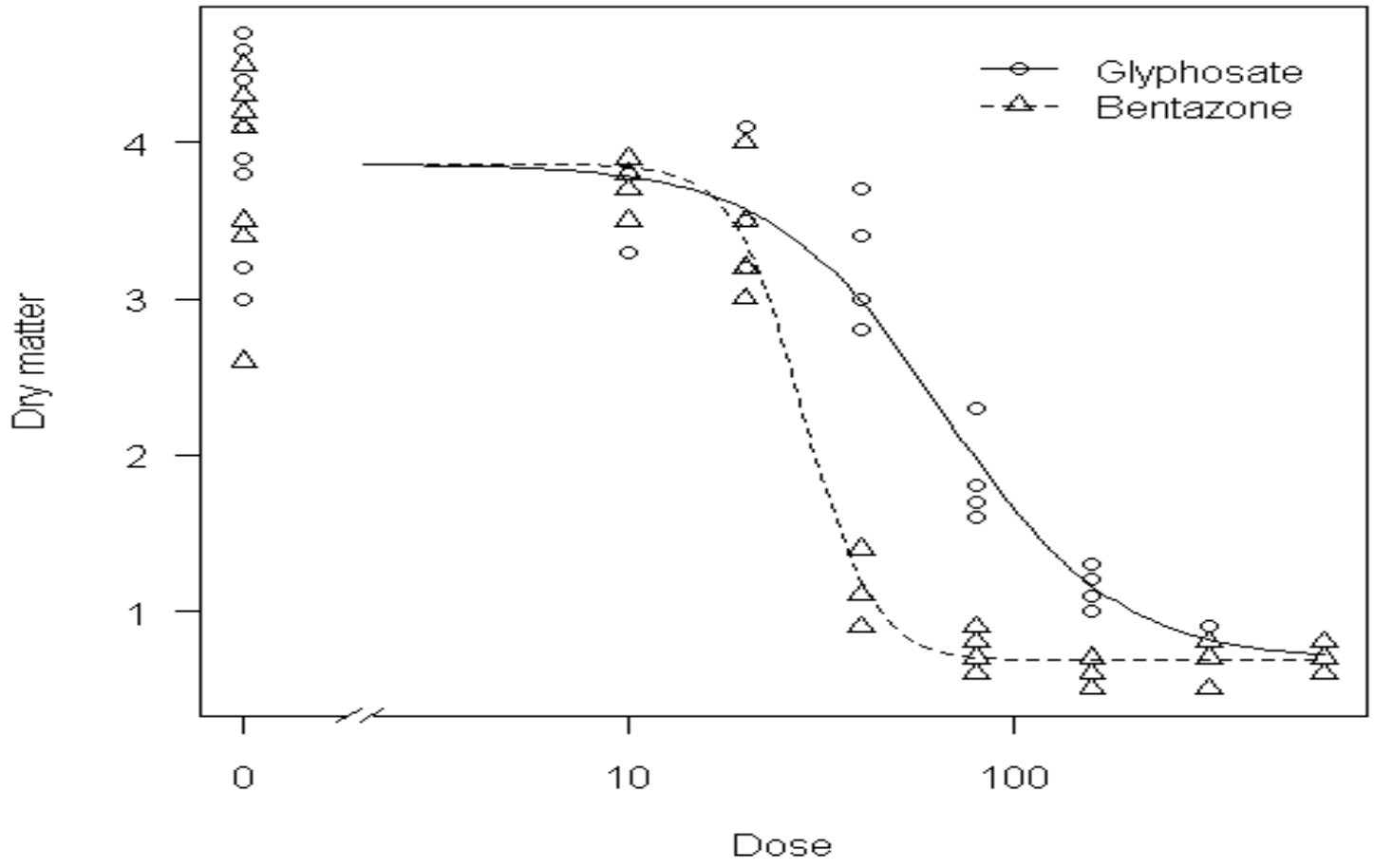
After-fitting: Accessing parameters of interest:

- `ED(), SI()` – estimated effect concentrations
- `MAX()` – maximum hormesis effects
- `yieldLoss()`

Other useful functions:

- `compParm()` – comparison of parameters
- `maED()` – model-averaging
- `rdrm()` – simulation of dose-response models

Visualization – traditional graphics



Future developments

This is a **dynamic** package community

Ongoing work:

- Bootstrap and other types of confidence intervals
- Extending mixed model capabilities
- Handling other types of response
- Robustifying starting value procedures
- Variance modelling
- Visualization using `lattice`