


ECOTOXICITY ELEMENTS
TOXICITY TO TERRESTRIAL ORGANISMS
Plants: *Sorghum bicolor*, *Helianthus annuus*, *Phaseolus aureus*

PAPER REVIEWED

Windeat A.J. 1987. Effects on the growth of *Sorghum bicolor*, *Helianthus annuus* and *Phaseolus aureus*. Unilever study report BL/B/3078 (R118). Unilever Research Port Sunlight Laboratory, Sunlight, UK.

TEST SUBSTANCE

- LAS (supplier not mentioned).

 Remarks: The neat material was 57.3 % (w/w) active LAS, average molecular weight 343 g/mole, distribution of the linear alkyl chains not specified. All data expressed in mg LAS (active substance) / kg d.w. soil.

METHOD

- Laboratory Imperial Chemical Industries PLC, Brixham Laboratory, Brixham, Devon, UK.
- Objectives To determine the effects of LAS on seed germination and growth of 3 plant species.
- Method/guideline followed A laboratory standard operating procedure based on OECD guideline 208 (OECD 1984) was used. Deviations from the OECD guideline are the following: % particles < 20 µg not given, 4.1 % instead of maximum 3 % organic carbon in the test soil, sand was sieved with a 1 mm mesh instead of sieving the soil with a 0.5 mm mesh, weight and viability of seeds not mentioned.
- Test substrate/application A test soil was used, consisting of commercially available potting compost (WC-B, supplier not mentioned) and washed, sieved (1 mm mesh), dried (temperature and time not mentioned) silver sand (supplier not mentioned). The sand:WC-B ratio was 1:9.
- GLP Yes.
- Year (study performed) 1987.

- Species/strain/supplier *Sorghum bicolor* var. *Dekalb 64* (crop sorghum): Dekalb, USA
Helianthus annuus var. *Rodeo* (sunflower): Codasal, France.
Phaseolus aureus (mung bean): Clause Seeds, Reading, UK.
- Analytical monitoring Nominal LAS concentrations were not measured.
- Exposure period Emergence: 7 days.
Growth: 21 days.
- Endpoints Emergence, growth (shoot fresh weight).
- Statistical methods The EC50 values were calculated with probit analysis according to Finney (1971).


 Remarks: /

RESULTS

- Nominal concentrations 0, 1, 10, 100, 1000 mg LAS / kg d.w.
- Measured concentrations Not available.
- NOEC, EC50 See Table 1. EC10 values and ECx values for emergence were not given in the reviewed manuscript. We calculated these ECx values based on Vanewijk and Hoekstra (1993, Table 2).

Table 1: NOEC and EC50 values (mg LAS / kg d.w.) for growth of the different tested plant species (14 days).

Species	Endpoint	NOEC	EC50
<i>Sorghum bicolor</i>	Growth	100	167
<i>Helianthus annuus</i>	Growth	100	289
<i>Phaseolus aureus</i>	Growth	100	316

 Remarks: No NOECs for emergence were available, although tables with the raw data were given (there were no replicates for this endpoint and hence no significant differences could be derived).

CONCLUSIONS

Sorghum bicolor was the most sensitive plant with an EC10 (growth, 21 day) of 68 mg LAS / kg d.w. (Table 2). Growth (21 days) was more sensitive than emergence (7 days).

RELIABILITY

Klimisch score (Klimisch *et al.* 1997) 2c (comparable to guideline study with acceptable restrictions): no measured concentrations; test-substrate and tested compound not fully described, nominal concentrations not measured.

REFERENCES

- Finney, D.J. 1971. Probit analysis, 3^d edition. Cambridge, UK.
OECD. 1984. OECD guideline for testing chemicals nr. 208:Terrestrial plants, growth test.
Van Ewijk, P.H., Hoekstra, J.A. 1993. Calculation of the EC50 and its confidence interval when subtoxic stimulus is present. *Ecotoxicology and Environmental Safety*, 25, 25-32.

ECx calculations performed by the reviewer (Dr. B. Versonnen, Ghent University)

Table 2 represents the results of our ECx calculations based on the raw data of the experiments.

Table 2: Calculated ECx values and confidence intervals (mg LAS / kg d.w.) performed according to Vanewijk and Hoekstra (1993) for the 3 plant species exposed to LAS (emergence: 7 days; growth: 21 days).

Species	Endpoint	EC10	EC50	Hormesis
<i>S. bicolor</i>	Emergence	345 (180-6599)	11434 (48-2.7E6)	No
	Growth	68 (31-150)	275 (163-462)	No
<i>H. annuus</i>	Emergence	N.A.	N.A.	N.A.
	Growth	116 (97-140)	260 (120-307)	Yes
<i>P. aureus</i>	Emergence	N.A.	N.A.	N.A.
	Growth	126 (52-306)	375 (224-625)	No

N.A. = data insufficient for ECx calculations.