

# Effect of carbamide-water-saccharose solution on honeybee in oral laboratory experiments: sublethal effects and concentration dependence of mortality rate

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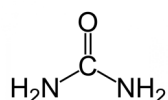
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## Carbamide (urea):

It is a component of biostimulant agrochemicals, and considered to be readily biodegradable. It is present in the bee gut, as a nitrogen content product of the protein metabolism of honeybees. However, we don't have enough information about its role in honeybee physiology, and potential toxicity to honeybees.



- Low lipophilicity
- High water solubility

Differs significantly from the carbamate insecticide homologues.

We made **seven concentrations** of carbamide solutions:

0,32 0,16 0,08 0,04 0,02 0,01, 0,005 g/ml



- dissolved in 50% saccharose-water syrup

- and fed to honeybee (*Apis mellifera*) groups,

- laboratory conditions, OECD 213, OECD 245 protocols.

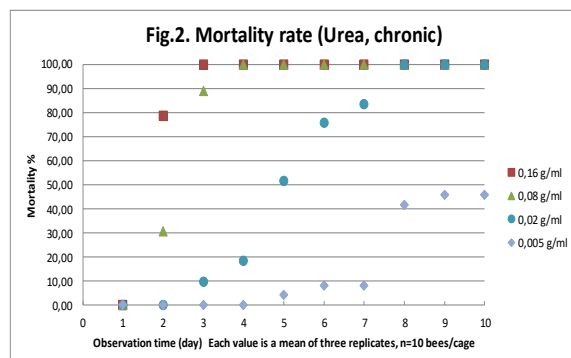
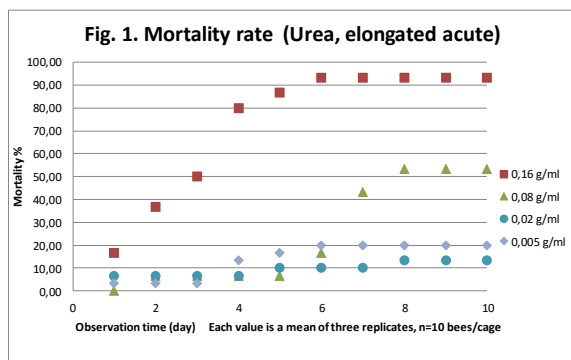


## 10 days: elongated acute and chronic treatments:

	3 x 10 bee / group / each concentration	Sublethal effects:	Mortality rate:
	10 day, 1 x 20 µl/bee	„Crawling” bees ✓	Depends on urea concentration (Fig.1.)
	10 day, ad libitum	„Crawling” bees ✓	Depends on urea concentration (Fig.2.)

Observed sublethal effects: apathy, crawling, inability to fly, in higher rate on the higher concentrations of urea consumed. At the end of the test period untreated control bees fly away, treated bees are unable to fly and leave the cage opened from above.

Mortality rate both in elongated acute and chronic tests depends on the concentration of the urea solution. Untreated control groups showed minimal mortality, ability to fly and normal, active behaviour.



**Table 1. Mortality %, mean. Elongated acute test and Chronic test.**

Conc. (g/ml)	1. day	2. day	3. day	4. day	5. day	6. day	7. day	8. day	9. day	10. day
0,32	36,7	56,7	60,0	63,3	83,3	83,3	83,3	93,3	100,0	100,0
0,16	16,7	36,7	50,0	80,0	86,7	93,3	93,3	93,3	93,3	93,3
0,08	0,0	6,7	6,7	6,7	6,7	16,7	43,3	53,3	53,3	53,3
0,04	3,3	6,7	6,7	6,7	6,7	6,7	6,7	6,7	6,7	6,7
0,02	6,7	6,7	6,7	6,7	10,0	10,0	10,0	13,3	13,3	13,3
0,01	10,0	10,0	10,0	10,0	10,0	10,0	13,3	13,3	13,3	13,3
0,005	3,3	3,3	3,3	13,3	16,7	20,0	20,0	20,0	20,0	20,0
0,00	13,3	10,0	10,0	13,3	13,3	13,3	20,0	20,0	20,0	20,0
0,32	51,9	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0
0,16	0,0	78,7	100,0	100,0	100,0	100,0	100,0	100,0	100,0	100,0
0,08	0,0	30,6	88,9	100,0	100,0	100,0	100,0	100,0	100,0	100,0
0,04	0,0	6,9	67,1	100,0	100,0	100,0	100,0	100,0	100,0	100,0
0,02	0,0	0,0	9,8	18,4	51,5	75,6	83,3	100,0	100,0	100,0
0,01	8,3	8,3	8,3	37,5	41,7	72,5	79,2	79,2	79,2	79,2
0,005	0,0	0,0	0,0	0,0	4,2	8,3	8,3	41,7	45,8	45,8
0,00	0,0	0,0	5,6	5,6	5,6	16,7	16,7	16,7	21,4	21,4

Our experiments show that even a single consumption of urea increases the mortality rate within 10 days, and that sublethal effects on movement and behaviour can inhibit the approach to the food source. Bees consuming higher doses of urea have a higher mortality rate. Our task is to analyse and evaluate further and to investigate the role of urea in the bee's organism.