

Influence of Vegetation Period on Antioxidant and Biocide Activity of Extracts from Hop Leaves



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Hop, *Humulus lupulus* (L.), is characterised by antimicrobial and antioxidant properties which are induced by the activity of secondary metabolites.

We tested the leaves from eight cultivars of hop from the Gene Bank of the Slovak Republic: Osvald's clones 31 (K-31) and 72 (K-72), Bor, Sldek, Aromat, Zlatan, Siřem, and Premiant. We collected the samples before flowering and at the end of the vegetal period. Extracts were prepared by methanol extraction in the ratio of 1:20. The extracts were evaporated and redissolved in methanol.

We used The DPPH method to determine the antioxidant capacity of the sample.

The antibacterial activity of the extracts was determined *in vitro* against a variety of phytopathogenic bacteria - Gram-positive bacteria (*Clavibacter michiganensis* subsp. *sepedonicus*), and Gram-negative bacteria (*Xanthomonas vesicatoria*, *Xanthomonas* sp., *Erwinia amylovora*, *Erwinia malitiosa*, *Pectobacterium carotovorum* subsp. *carotovorum*, *Pseudomonas syringae* pv. *syringae*). A biocide effect was compared with the effect of the 1.2% solution of TMTD (tetramethylthiuram disulfide), an active substance of commercial pesticides.

The antioxidant activity of the leaf extract depends mainly on the type of cultivar.

The results of antibacterial activity approves that this effect relates to sensibility of a particular bacterial strain and hop cultivar. We observed the influence of the vegetal period, too.

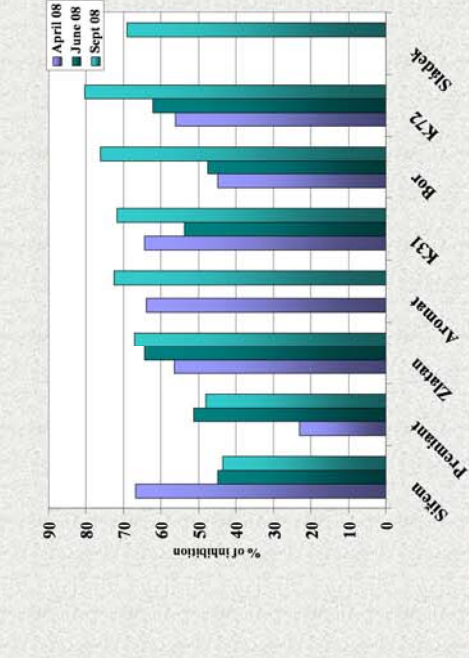


Fig. 1 Antioxidant activity of hop extracts from leaves during the vegetal period

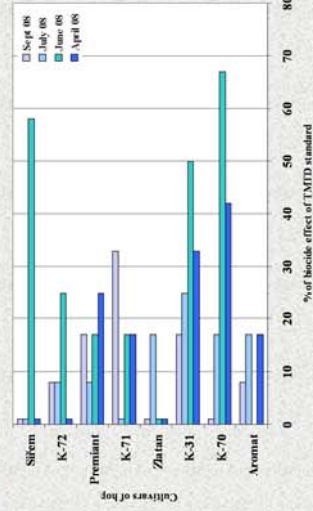


Fig. 2 Biocide effect of hop extracts on the growth of *Erwinia malitiosa*



Tab. 1 Biocide effect of hop extracts during the vegetal period described as zones without the growth of bacteria on the agar plate in mm.

Cultivars	<i>E. amylovora</i>		<i>X. vesicatoria</i>		<i>P. carotovorum</i>		<i>P. syringae</i>		<i>C. mich. subsp. sepedonicus</i>	
	April 08	June 08	April 08	June 08	April 08	June 08	April 08	June 08	April 08	June 08
Aromat	3	-	1	2	-	1	2	-	<1	2
Bor	<1	<1	2	3	4	<1	2	3	1	<1
K-31	2	3	<1	2	3	4	3	2	2	4
Zlatan	2	2	<1	2	3	<1	6	<1	2	2
Sldek	2	2	<1	2	2	<1	4	1	2	2
Premiant	2	2	1	2	5	2	4	4	4	2
K-72	1	2	1	3	3	2	<1	5	2	<1
Siřem	<1	<1	1	3	4	<1	2	3	<1	2

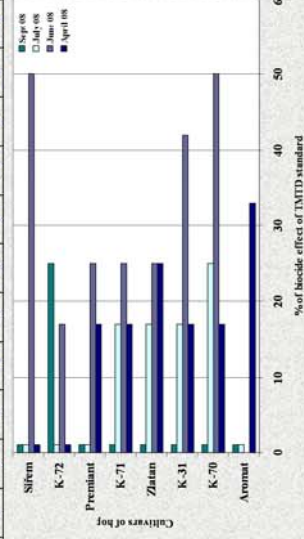


Fig. 3 Biocide effect of hop extracts on the growth of *Xanthomonas* sp.

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